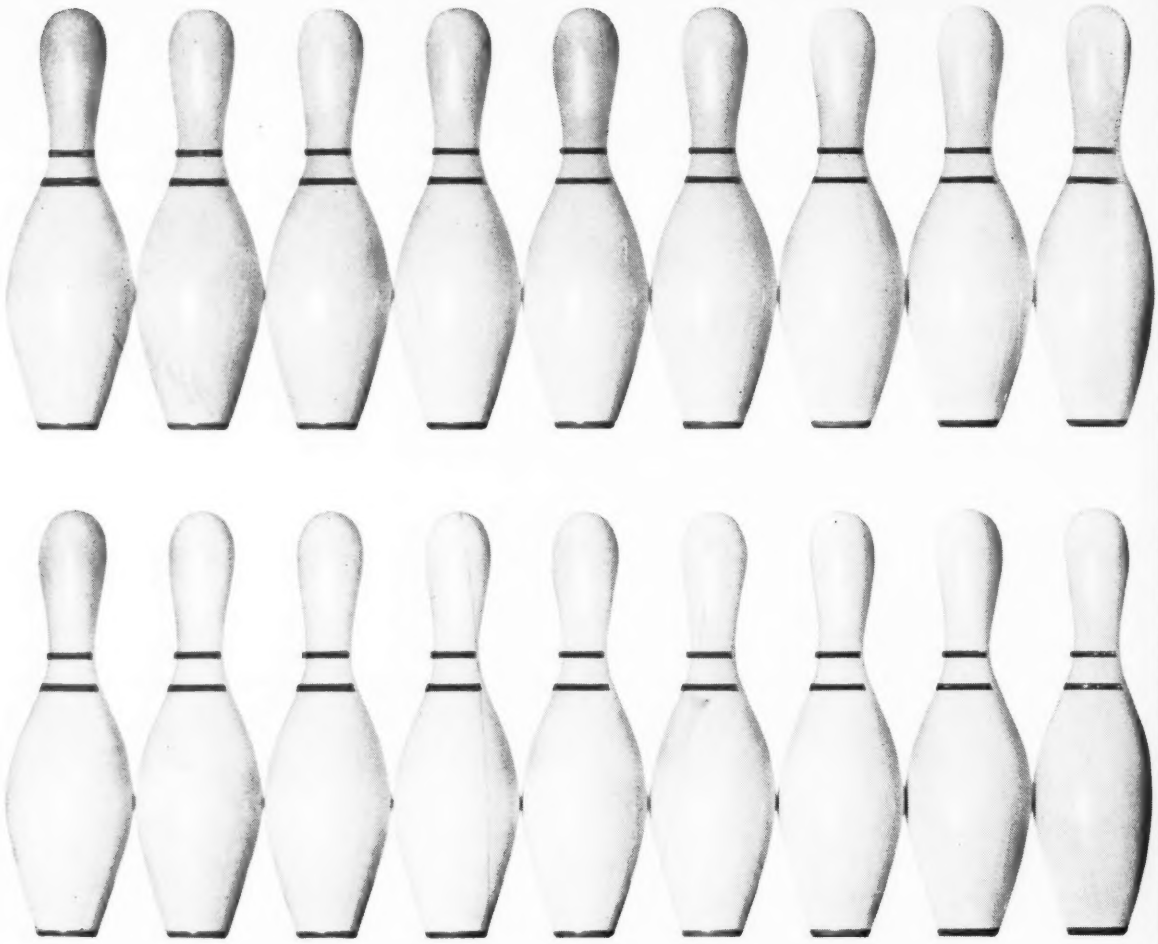
SEPTEMBER 1961

RUBBER WORLD



Du Pont means *UNIFORMITY* in Rubber Chemicals

Du Pont rubber chemicals are made to exacting standards of quality and reliability to meet rigid inspection controls.

That's why you, like so many leading manufacturers, can depend on Du Pont rubber chemicals to meet your most rigorous requirements.

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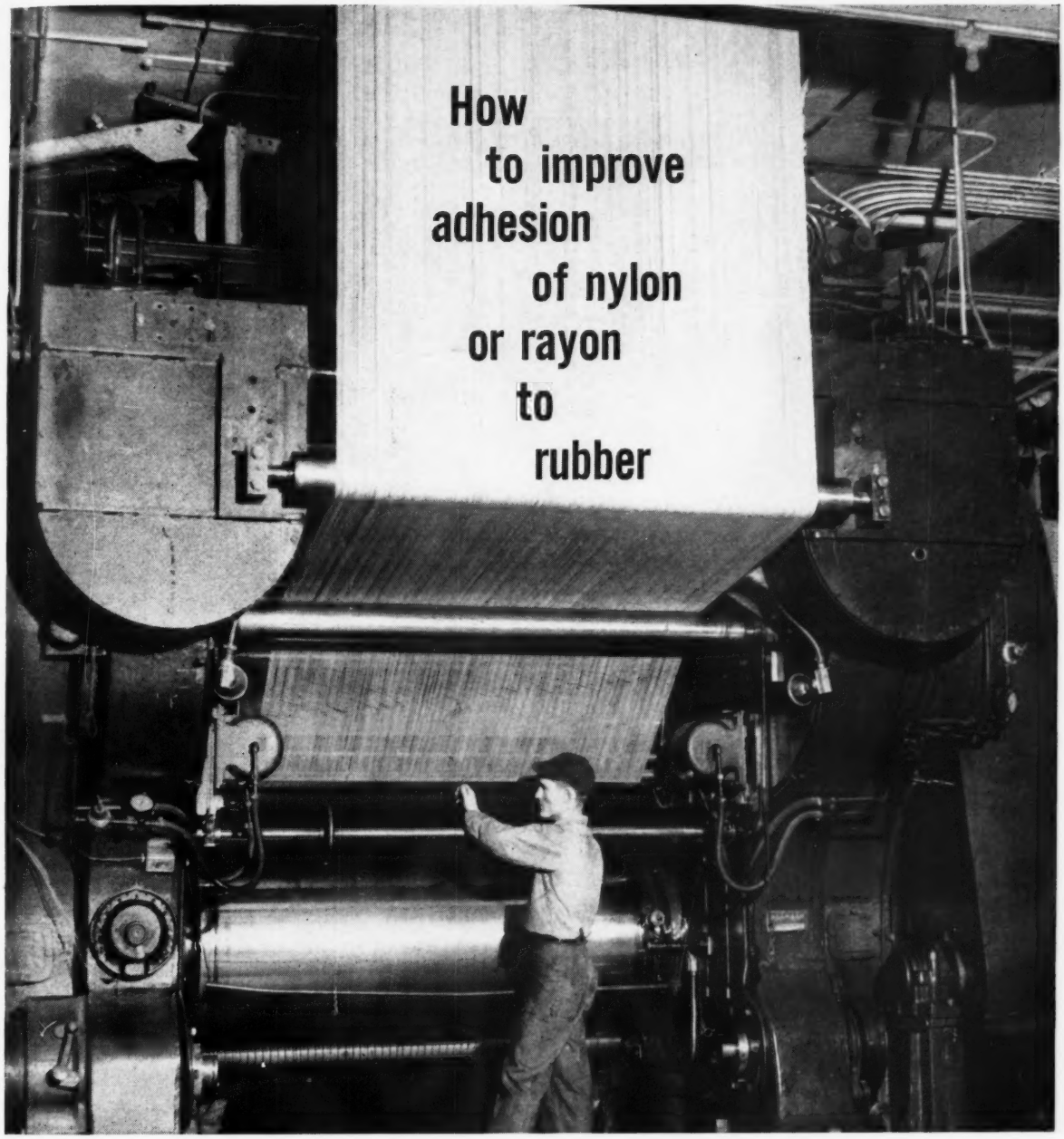
DU PONT

ELASTOMER CHEMICALS DEPARTMENT
RUBBER CHEMICALS

Better Things for Better Living . . . *through Chemistry*

RUBBER WORLD, September, 1961, Vol. 144, No. 6. Published monthly by BILL BROTHERS PUBLISHING CORP. Office of Publication, 3rd & Hunting Park Ave., Philadelphia 40, Pa., with Editorial and Executive Offices at 630 Third Avenue, New York 17, N. Y., U.S.A. Second Class Postage Paid at Philadelphia, Pa., under the act of March 3, 1879. Subscription United States $5.00 per year; Canada $6.00; all other countries $10.00. Single Copies 50¢ in U.S.; $1.00 elsewhere. Address Mail to N. Y. Office.



USE HYCAR 2518. This new vinyl pyridine latex resulted from years of study of problems relating to achieving better performance of fiber-reinforced rubber products. Using Hycar 2518 as pretreatment of man-made yarns, cord and fabric gives positive control, exceptionally high adhesion, easily processed formulations and good "green tack."

Recipes vary according to the fiber involved, the type of rubber stock, and processing limitations and application requirements. Superior adhesion results in all cases. Hand or stiffness of treated fabric or cord can be varied to meet specific needs.

To get more information about this or other ways you can produce better textiles, often at lower costs, write today for information to Department MD-7, B.F.Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, Ohio. In Canada: Kitchener Ontario.

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RUBBER WORLD

VOLUME 144 NUMBER 6 SEPTEMBER, 1961

CONTENTS

Cover photo courtesy of Sid Richardson Carbon Co.

SERVING THE RUBBER INDUSTRY SINCE 1889

A BILL BROTHERS PUBLICATION

FEATURE DEPARTMENTS

BILL BROTHERS PUBLISHING CORPORATION

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O is for Obtaining Outstanding abrasion resistance

Safe! Safe against wear and tear! Makers of tire treads, shoe soles and other rubber articles that must withstand severe abrasion, find that Philblack* O combines strong reinforcing qualities with good processing characteristics.

Let your Phillips technical representative show you how the proper Philblack in your recipe can help you achieve . . . better quality product, speedier processing, easier plant operation, and often lower over-all costs. Telephone and ask your Phillips technical representative to drop in soon.

LET ALL THE PHILBLACKS WORK FOR YOU!

A **Philblack A, Fast Extrusion Furnace Black.** Excellent tubing, molding, calendering, finish! Mixes easily. Disperses heat. Non-staining.

O **Philblack O, High Abrasion Furnace Black.** For long, durable life. Good conductivity. Excellent flex life and hot tensile. Easy processing.

I **Philblack I, Intermediate Super Abrasion Furnace Black.** Superior abrasion. More tread miles at moderate cost.

E **Philblack E, Super Abrasion Furnace Black.** Toughest black yet! Extreme resistance to abrasion.

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Export Sales: Phillips Petroleum International Corporation, Sumatrastrasse 27, Zurich 6, Switzerland

Distributors of Phillips Chemical Company Products, 80 Broadway, New York 5, N.Y.

news of the rubber world

September, 1961

Three new carbon black plants have begun operations, adding to world productive capacity. Sid Richardson has joined the ranks of furnace black producers with a reactor at Big Springs, Tex. Continental Carbon is now producing blacks for the West Coast at Bakersfield, Calif. United Carbon has moved into the European market with a plant in the heart of the French rubber industry at Port Jerome, France. United Carbon will formally dedicate this installation this month. See page 104.

Columbian Carbon Co. also makes news this month with the announcement that the board of directors along with the board of Cities Service Co. has proposed a merger of the two companies. The proposal will be presented to stockholders' meetings later this year for approval.

J. P. Seiberling has retired as chief executive officer of Seiberling Rubber Co. While he will continue as chairman of the board, he thus turns over the reins to the new president, H. P. Schrank, former executive vice president. Schrank becomes the third president of the firm. Mr. Seiberling took over from his father, F. A. Seiberling, in 1938.

Rubber-to-metal bonding is covered for us this month in a specially written article by Hughson Chemical Co. A review of the history and a description of current technolgy on use of Chemlok bonding agents will be found on page 75.

More good news about prices in the synthetic rubber field. General Electric Silicone Products Department has announced price reductions on all gums and reinforced gums as well as some compounds. Almost half of the GE silicone rubber line is included. While individual items, gums, reinforced gums, or compounds, have been reduced in the past, this is thought to be the first time such a large group of silicone materials has been reduced in price at one time. See page 109.

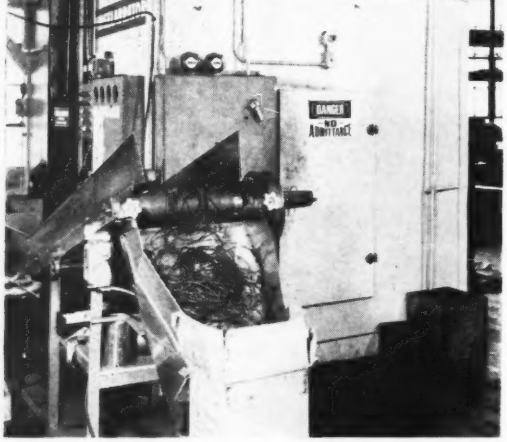
Labor cost savings averaging 60% have been achieved by one of the leading Midwestern rubber plants, deflashing precision mechanical rubber parts like these typical seals.

instantaneous deflashing with the new WHEELABRATOR® impact deflasher

Big parts, small parts, rubber parts with metal inserts—any precision molded mechanical rubber goods can now be deflashed almost instantaneously by the new Wheelabrator impact deflashing method.

Developed by Wheelabrator Corp. in cooperation with major rubber products manufacturers, the impact method has proven its cost-cutting effectiveness in actual working installations. It is so rapid that thorough deflashing is accomplished in from 3 to 5 minutes on as many as 10,000 parts at a time. Production rates from 20 to 300 times faster than methods previously considered to be the best obtainable are being achieved regularly.

Almost any type of molded rubber part can be impact-deflashed successfully where flash thickness is controlled. The expensive hand labor of buffing, tearing, scissors and knife trimming, and similar manual operations are completely eliminated.



PERFORMANCE PROVES THE SAVINGS OF WHEELABRATOR RUBBER DEFLASHING

At a prominent Chicago rubber molding plant one Wheelabrator rubber deflashing cabinet has replaced 10 workers who formerly hand finished O-rings and other molded products.

Man-hours required for finishing 2" to 16" I.D. O-rings, with sectional diameters less than a quarter-inch, have been reduced by 87% to 97%. On other molded parts having irregular shapes, hand labor has been reduced from 36% to 86%, with an average labor saving of approximately 60%.

The finish obtained, and the thoroughness of the deflashing operation, is superior to that formerly obtained by hand methods. Precision parts with thin cross sections, parts too fragile for conventional CO_2 tumbling, and parts too complex for efficient hand trimming, are now being deflashed at tremendous savings.

A REVOLUTIONARY NEW PROCESS FOR RUBBER PARTS PRODUCERS

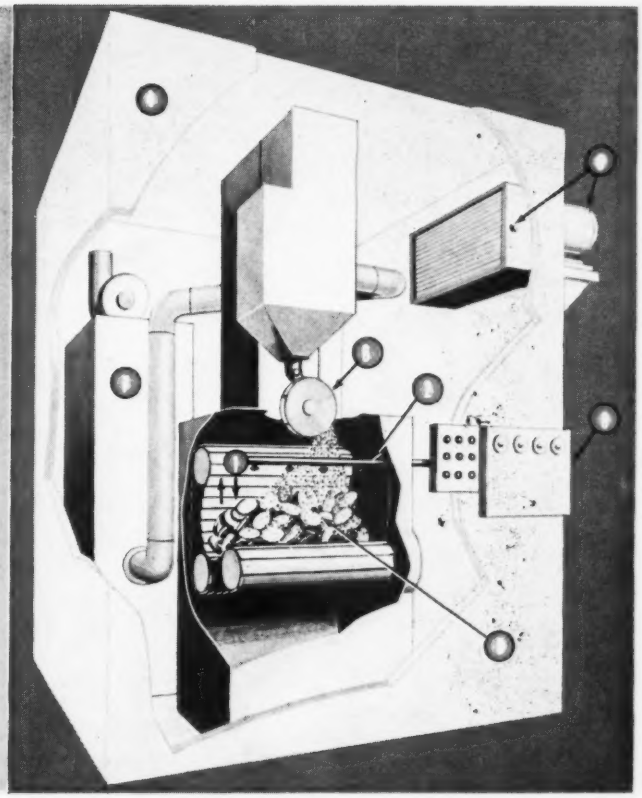
The Wheelabrator impact deflashing method takes the hand work out of deflashing, mechanically removes the flash from large quantities of parts in cycles of only 3 to 5 minutes.

Parts are first loaded onto a moving endless belt conveyor within the 2 cu. ft. work chamber, (1) which handles hundreds to thousands of parts in one batch.

Liquid CO_2 from a low pressure system is sprayed through nozzles to freeze the flash, without freezing the parts themselves (2) An auxiliary refrigeration system (3) keeps the enclosure at a low temperature. With the accurate controls provided, CO_2 gas consumption averages less than 5 lbs. per load. A fully insulated enclosure (4) houses all operating equipment.

With flash frozen, the parts are gently turned over continuously within the blast of the deflashing media (5) exposing all areas of the parts to the deflashing blast.

An 8-bladed wheel (6), utilizing centrifugal force, hurls deflashing media in a controlled pattern on the parts. The impact of these particles trims the frozen flash, without damage to the resilient, unfrozen parts. The media is continuously recycled and cleaned, while a closed-cycle dust collecting system (7) ventilates the entire operation. All operations are automatically timed and sequenced from a convenient control panel (8).



LET US PROVE THE SAVINGS YOU CAN MAKE

Arrangements can be made for you to attend an actual demonstration of the process on your molded parts in our laboratory. Here you will see the tremendous saving potential and exact processing cycles on an actual production machine. Naturally, there is no obligation to you. For detailed information write today or return the convenient coupon below to WHEELABRATOR CORPORATION, 644 S. Byrkit Street, Mishawaka, Indiana. In Canada, WHEELABRATOR CORP. OF CANADA, LTD., P.O. Box 490, Scarborough, Ontario.

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Rubber Deflashing

WHEELABRATOR CORP. 644 S. Byrkit St., Mishawaka, Ind.

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☐ Have field engineer call.

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The largest modern dry ice car made today—50 ton capacity.

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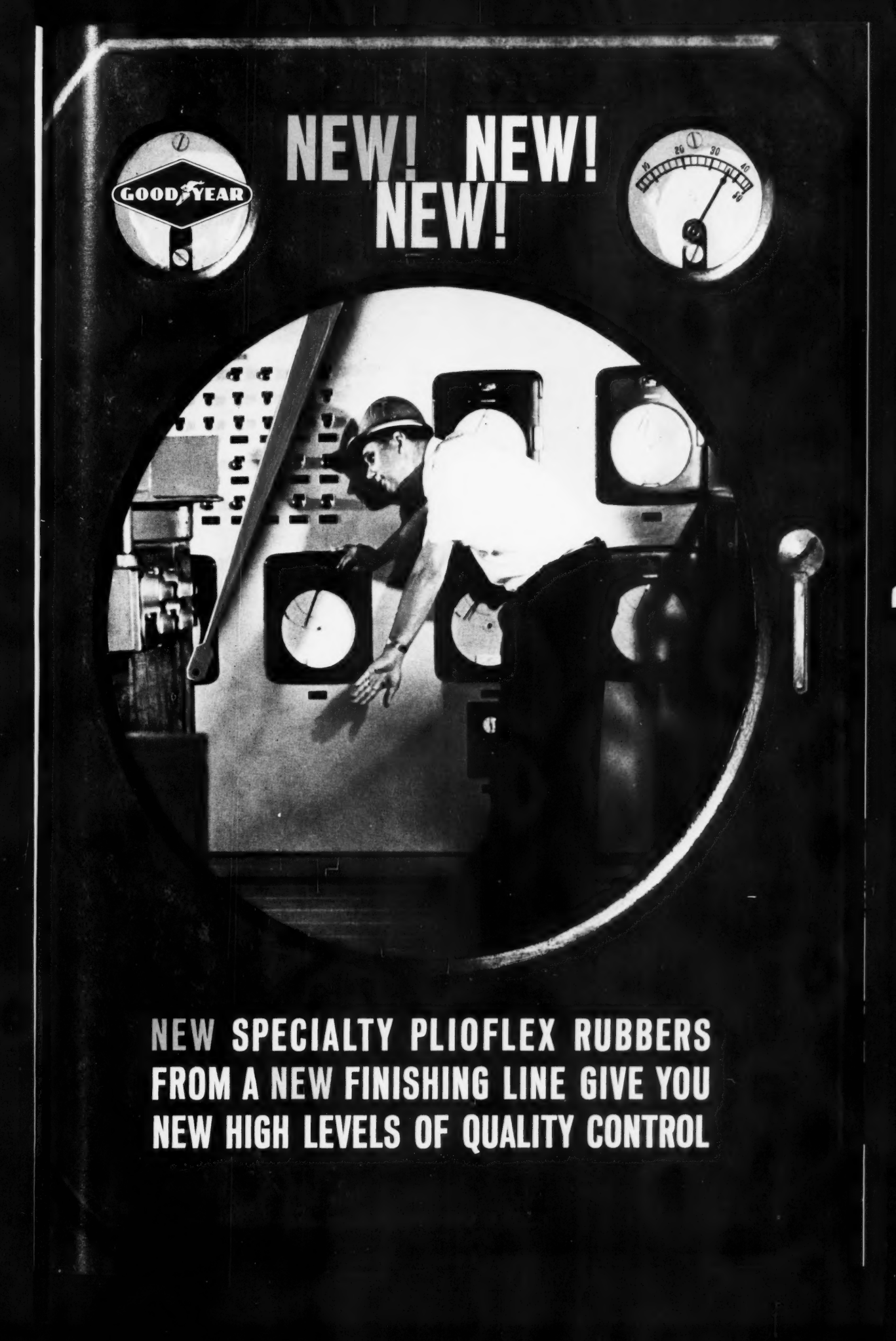
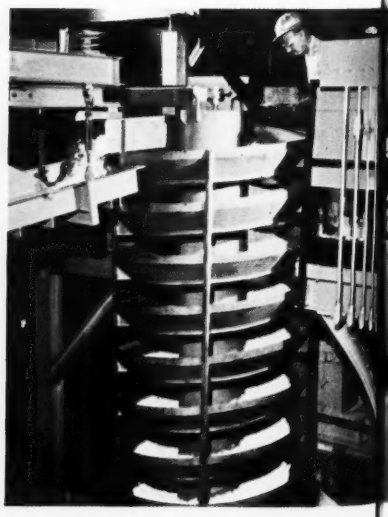
RLD


GOODYEAR
NEW! NEW!
NEW!
NEW SPECIALTY PLIOFLEX RUBBERS
FROM A NEW FINISHING LINE GIVE YOU
NEW HIGH LEVELS OF QUALITY CONTROL

100% continuous processing and fi
possible new specialty Plioflex R

The world's first all-stainless steel polymer finishing line is now operating as your *continuous* assurance of closely controlled quality in new, special-grade PLIOFLEX rubbers. Combining the largest, *continuous* latex source with the latest techniques in *continuous* finishing, this all-new installation means that at Goodyear-Houston – world's largest synthetic rubber plant – the uniformity and purity of specialty rubbers is automatically controlled from reactor to bale.

First thing you notice about the new finishing line is its cleanliness. All equipment is constructed of gleaming stainless steel and housed in a brand-new building to remove the major



HIGH LEVEL OF PURITY for new specialty PLIOFLEX rubbers is achieved by combining the efficiency of largest, continuous latex source with the latest, most refined, continuous finishing techniques.

VERTICAL VIBRATING CONVEYORS hold contaminants to new low.

finishing at Goodyear-Houston make Rubbers of precisely controlled quality!

causes of rubber contamination – dirt, rust and other corrosion products.

Other unusual features include an expeller de-waterer which reduces the moisture content of the crumb rubber to 12%, compared to the conventional 40%, and reduces nonrubber impurities at the same time. This de-waterer also makes possible the use of a single-pass dryer, which means a shorter heat history for the end product. The dryer utilizes indirect heat and filtered air—eliminating the chance of contamination by carbon from the heat source or by impurities in the atmosphere.

Vertical vibrating conveyors are still another highlight of the new finishing line. Used at both ends of the dryer, they eliminate the chance of rubber crumb clinging to equipment – a common problem with closed pneumatic systems or bucket conveyors.

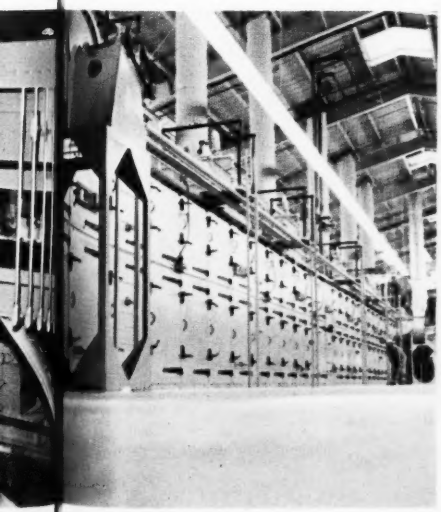
Most important of all, a complex system of automatic measuring and metering devices plus electronic controls assures that every step in the entire operation is precisely governed.

What do all these advances in quality control mean to you? A new and consistently high level of purity and uniformity in specialty styrene/butadiene rubbers.

The specialty rubbers that will be produced on the new finishing line expand the already large PLIOFLEX family of fine rubbers. They are:

- ★ PLIOFLEX 1019, 1503, 1708, and 1715—Low Water Absorption rubbers.
- ★ PLIOFLEX 503A and 504A—LWA rubber/resin masterbatches.
- ★ PLIOFLEX 1006 – a special grade for the most exacting plastics modification.

These new rubbers give you a significantly broader choice, particularly where you need high quality and uniformity for the manufacture of wire and cable coverings, plastics, shoe products, adhesives and other critical applications.



SINGLE-PASS DRYER, with indirect heating and filtered air, eliminates contamination from heat source.

PRECISION CONTROL DEVICES provide accurate step-by-step processing.

AUTOMATIC BALER puts the PLIOFLEX rubber you need in the package you want.

IN REGULAR OR SPECIALTY GRADES . . .

PLIOFLEX rubbers with Assured Processability are problem-solvers!

Here are some typical success stories:

Photo taken with cooperation of Schacht Rubber Mfg. Co., Inc., Huntington, Ind.

PROBLEM: Cut rejects in manufacture of low-cost, rubber flower pots.
PROBLEM-SOLVER: PLIOFLEX 1773. Although oil-extended, its excellent color and high uniformity permitted fast, continuous production of consistently acceptable products.

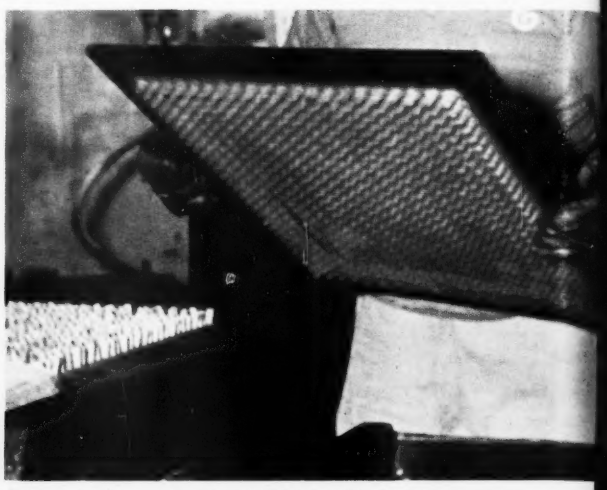


Photo taken with cooperation of Eberhard Faber Inc., Wilkes-Barre, Pa.

PROBLEM: Cut costs on daily output of 2 million pencil erasers.
PROBLEM-SOLVER: PLIOFLEX 1006. Its processing ease, uniformity and cleanliness eliminated premastication and permitted reuse of scrap without grinding, while providing a better aging product.

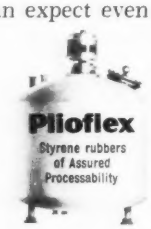
Photo taken with cooperation of Rubbermaid, Inc., Wooster, Ohio

PROBLEM: Improve production of blown rubber kneeling pads while maintaining quality.
PROBLEM-SOLVER: PLIOFLEX 1510. It reduced sticking, permitted lower curing temperatures and provided reworkable scrap. At the same time, it improved cell structure and tear strength.

Photo taken with cooperation of Globe Rubber Products Corporation, Philadelphia, Pa.

PROBLEM: Upgrade performance and sales appeal of car mats without raising costs.
PROBLEM-SOLVER: PLIOFLEX 1778. Low in cost and oil-extended, its light color, uniformity and toughness permitted economical production of durable, brightly colored, highly salable mats.

These are just a few of many ways PLIOFLEX rubbers solve problems. Now with even more rubbers at your disposal, thanks to the all-stainless steel Houston finishing line, you can expect even more striking success stories coming out of your own plant. For pertinent data including the latest *Tech Book Bulletins*—plus outstanding technical assistance with your application—write Goodyear, Chemical Division, Dept. K-9418, Akron 16, Ohio.



Lots of good things come from

GOODYEAR

CHEMICAL DIVISION

Plioflex—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

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Mobilplex EP grease has good pumpability over wide ranges of temperature and shear rates. Here, Mobilplex EP is pumped through a 24-foot coil of ⅜" tubing frozen in ice at 15 F . . . remains pumpable, permits continuous delivery even at critical pumping rate.

Mobilplex EP resists both water wash and runout caused by heat. In this demonstration, an immersion heater is used to boil water in a conventional mesh vegetable strainer coated with Mobilplex EP. Grease maintains a water-tight film even under these adverse conditions.

Mobilplex EP gives extra protection against wear under heavy and shock loads. Here, two split "bearings" consisting of V-shaped bushings are clamped under equal pressure on a polished steel shaft. The front bearing is lubricated with Mobilplex EP; the rear bearing with a high quality non-EP grease. When bearings are reciprocated in opposite directions, the shaft turns with the rear bearing, indicating frictional resistance is greatest at this point.

EVALUATION SUMMARY
MOBILPLEX EP (1) and 5 Leading Competitive EP Greases (A,B,C,D,E)

PROPERTY EVALUATED	RATING			
	Excellent	*Good*	*Fair*	*Poor*
Heat Resistance	M	A	C,D,E	B
Service Performance	M	A,C,E	B,D	
Extreme Pressure	M ,A,C	B,D,E		
Anti-Wear	M ,A	B,C	D,E	
Rust Protection		M ,B,C, D,E		A
Water Resistance		M ,B,C	A,D,E	
Handling Properties		M ,A,B C,D,E		
Controlled Bleeding		M ,A,C	B,D,E	
Non-staining		M	A,B, D,E	C

This chart summarizes results of an extensive evaluation program at Mobil Research. For complete details ask your Mobil representative.

The Multi-Service Grease with unique Calcium EP Complex. Never before in a single lubricant such a wide range of use . . . such a margin of superiority . . . such a potential for maintenance savings!*

Versatility unparalleled...

Mobilplex ep

A product of Mobil research . . . Mobilplex EP . . . a Multi-Service extreme-pressure grease far superior in quality and range of applications to any multi-purpose grease available.

Mobilplex EP, with a unique Calcium EP Complex, provides maximum protection against wear, rust, washout and heat. Because of its greater versatility, Mobilplex EP goes further than competitive extreme-pressure greases in simplifying your lubricant application, storage and purchasing practices. This new-type lubricant has given industrial machines greater protection while replacing as many as seven other greases. Mobilplex EP has all of the advantages usually associated with EP greases—as well as excellent storage, structural and oxidation stability.

Examination of the Socony Mobil evaluation summary at left shows that in comparison with five competitive extreme-pressure lubricants Mobilplex EP is the only grease excellent or good in every grease quality tested. No wonder aluminum and steel mills, metalworking shops, cement plants, and the chemical and rubber industries are reporting dramatic success with Mobilplex EP.

For full details contact your local Mobil representative, or write Mobil Oil Company, 150 East 42nd Street, New York 17, New York.

*Multi-Service means excellent for all types of anti-friction and plain bearings under various operating conditions up to temperatures in the range of 500 F. and for all types of dispensing equipment.

For a descriptive brochure and specific recommendations, cut out and mail on your letterhead.

Mobil Oil Company, Room 2057D

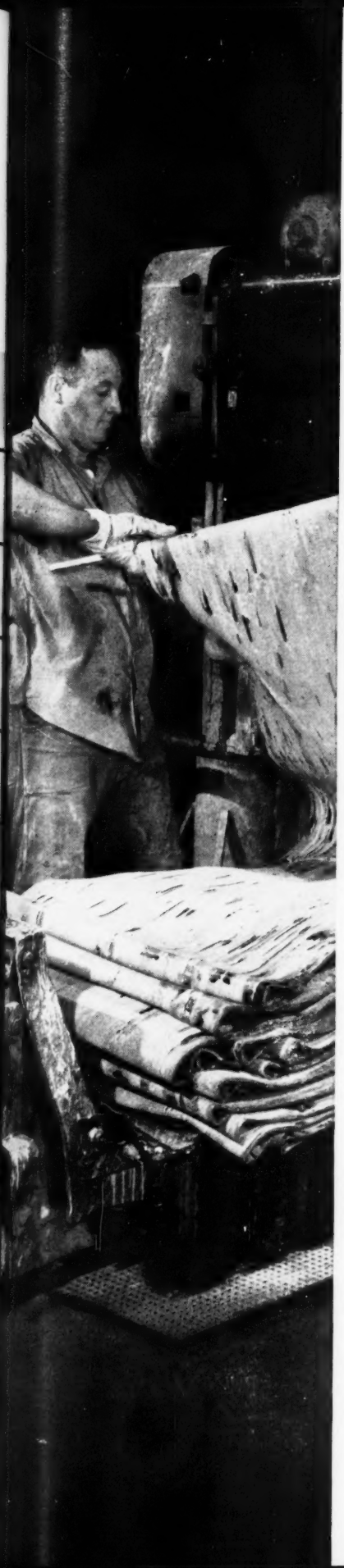
Gentlemen: Re: Mobilplex EP Grease Ad. Please have technical representative call to discuss:

- ☐ Performance results.
- ☐ A specific grease lubrication problem involving water——caustic——acid——heat——.
- ☐ Reducing the number of greases in my plant.

Mobil

Proved Petroleum Products . . . Available with a Mobil Program of Correct Lubrication


POUNDS OF FINISHED COMPOUND PER MAN HOUR
DRY MIX
GENTRO-



Gentro-Jet®

cuts mixing time up to 40%

Rubber processors across the nation report amazing reductions in mixing and processing time with steam-whipped Gentro-Jet black masterbatch. This time savings means greater production economy . . . higher profits for you. Let us show you how high-dispersion Gentro-Jet can help you make more money . . . write or call today!

GENTRO-JET BLACKMASTERS OFFER:

- Long tread wear in tires
- Savings in shipping, storage and handling
- Plant cleanliness

Creating Progress Through Chemistry

Chemical Division GENERAL

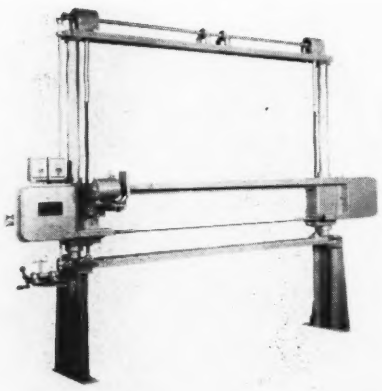
THE GENERAL TIRE & RUBBER CO

THE GENERAL TIRE & RUBBER COMPANY

Chemical Division · Akron, Ohio

Chemicals for the rubber, paint, paper, textile, plastics and other industries: **GENTRO SBR** *rubber* • **GENTRO-JET** *black masterbatch* • **GEN-FLO** *styrene-butadiene latices* • **GEN-TAC** *vinyl pyridine latex* • **GENTHANE** *polyurethane elastomer* • **VYGEN PVC** *resins* • **KURE-BLEND** TMTD *masterbatch* • **KO-BLEND** *insoluble sulfur masterbatch*

new equipment



Universal splitting head for foam

Splitter for Plastic Foam

FEMCO, Cuyahoga Falls, O., has developed a universal splitting head that will split and level rigid or flexible foams as thick as 42 inches. The cutting knife is adjustable from ¼-inch to 42 inches above the conveyor surface, and it is available in 50-, 60-, 72-, or 80-inch widths. Optional equipment as automatic indexing, motorized blade sharpener, swivel mounting, and adjustable compression roll assembly is available. The unit can also be used to cut foam rubber, curled hair, fiber glass, and bonded latex.

Ultrasonic Emulsifier

Branson Instruments, Inc., Stamford, Conn., has introduced a new compact 75-watt ultrasonic emulsifier, S-75 Sonifier, as a laboratory tool for dispersions in many fields including rubber, plastic, and chemical.

High-frequency electrical energy from a 75-watt generator is converted into 20-kc. ultrasonic vibrations by a piezoelectric transducer using a lead zirconate titanate element permitting up to three times the power capacity of other conventional transducer materials. A metallic cone couples the ultrasonic energy to a removable bit and increases vibration amplitudes at the tip, providing greater energy intensities. Combinations of eight power levels with various size and material tool bits provide a broad range for efficient emulsification.

TORTURE TEST for WHITEWALLS!

A.S.T.M. Static Bend Tests being conducted on whitewall compounds at the Rubber Laboratory of The New Jersey Zinc Company.

HORSE HEAD® TITANIUM DIOXIDES and ZINC OXIDES

Outdoor exposure of flexed whitewall compounds, using the A.S.T.M. Static Bend Test, reveals the merits of different pigments.

Some compounds pass the test with flying colors. Others fail to fulfill even the minimum requirements of modern whitewall performance.

In accelerated service tests and in actual road performance, whitewalls properly compounded with HORSE HEAD anatase titanium dioxide and PROTOX® zinc oxide offer maximum resistance to flex cracking. They excel in whiteness and brightness, too.

Ask about HORSE HEAD titanium dioxides and PROTOX zinc oxides for superior whitewall compounding.

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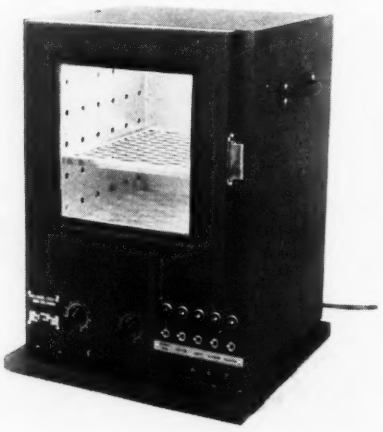
new equipment



One cubic-foot capacity ozone test chamber

Miniature Ozone Chamber

Ozone Research & Equipment Corp., Phoenix, Ariz., has introduced a new miniature ozone test chamber of one cubic-foot capacity to serve modest ozone test programs and as an overflow chamber for overflow programs. The unit is manually controlled and provides ozone concentrations from 25 to 700 pphm/volume and temperature adjustment up to 150° F. The miniature chamber incorporates all the significant features of standard ozone chambers: stainless-steel oven, interior light, glass observation window, air recirculation, and air flow. The miniature chamber weighs 85 pounds and consumes 275 watts at 115 volts a.c.; overall dimensions are 15 by 20½ by 16 inches.

A companion Model MSA provides 0.005%-0.030% concentration range for wire and cable tests.

Portable Vibrator

The Cleveland Vibrator Co., Cleveland, O., has developed a detachable, lightweight vibrator powered by air for applications which require occasional vibration. Called the LSKO-VG, the vibrator attaches to concrete forms, foundry core boxes, bins, or other objects. A sliding rod tightens the jaws of the clamp to any structural member up to four inches thick.

Vibratory force comes from the one-piece air vibrator bolted to the vise clamp. Air pressure drives the piston within the vibrator cylinder. Lubrication of the air cylinder may be provided automatically by feeding oil into the air stream. In areas where noise is an objectionable factor, the cylinder may be air cushioned for quiet operation, the company says.

(Continued on page 32)

New 15-man fabric life raft inflates itself in 30 seconds

Case for raft is strong, buoyant "Exp-a-n-ded Royalite,"* strategically located on the weather deck. It is automatically released if the vessel sinks beyond a depth of ten feet—and pops to the surface.

This inflatable raft design utilizes a unique boarding platform and weatherproof canopy, has four separate air chambers in the hull and gunwale tubes to assure flotation in the event one is damaged.

All you do is throw a plastic case overboard. When a lanyard has played out, the case opens—and CO_2 cylinders automatically inflate a raft that holds up to 15 passengers! Among its notable features: a platform that simplifies boarding and a canopy for protection from wind, rain and extreme temperatures.

A product of United States Rubber Company, this raft is made of nylon fabric from Wellington Sears. Coated with neoprene and vulcanized, the strong, light fabric assures long life in both extended storage and service.

This new development in sea rescue has been used for several years by inland shippers, towing companies and yacht owners. Recently given the official approval of the U. S. Coast Guard, it will soon be supplementing lifeboats on many classes of passenger and cargo vessels.

Countless fine companies rely on Wellington Sears to engineer fabrics for specific jobs. Our long experience and extensive research facilities assure top performance, whatever the requirements. Write for assistance and our illustrated booklet, "Fabrics Plus," Dept. H-9.

*T. M.—U. S. Rubber Co.

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FIRST in Fabrics for Industry

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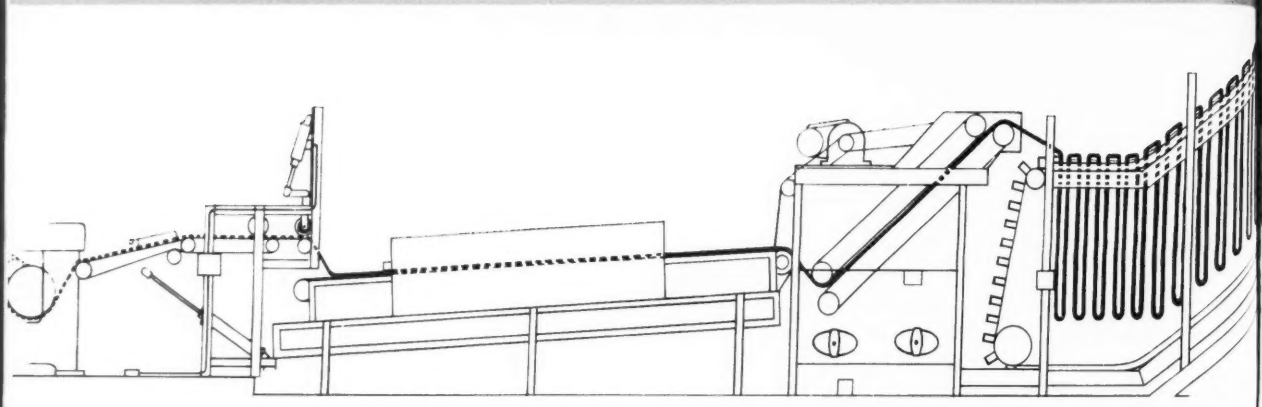
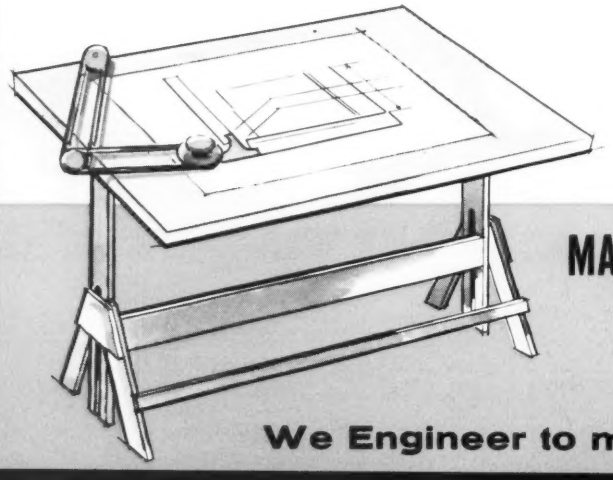
Plan on BATCH-OFF EQUIPMENT CUSTOM-BUILT By AKRON STANDARD

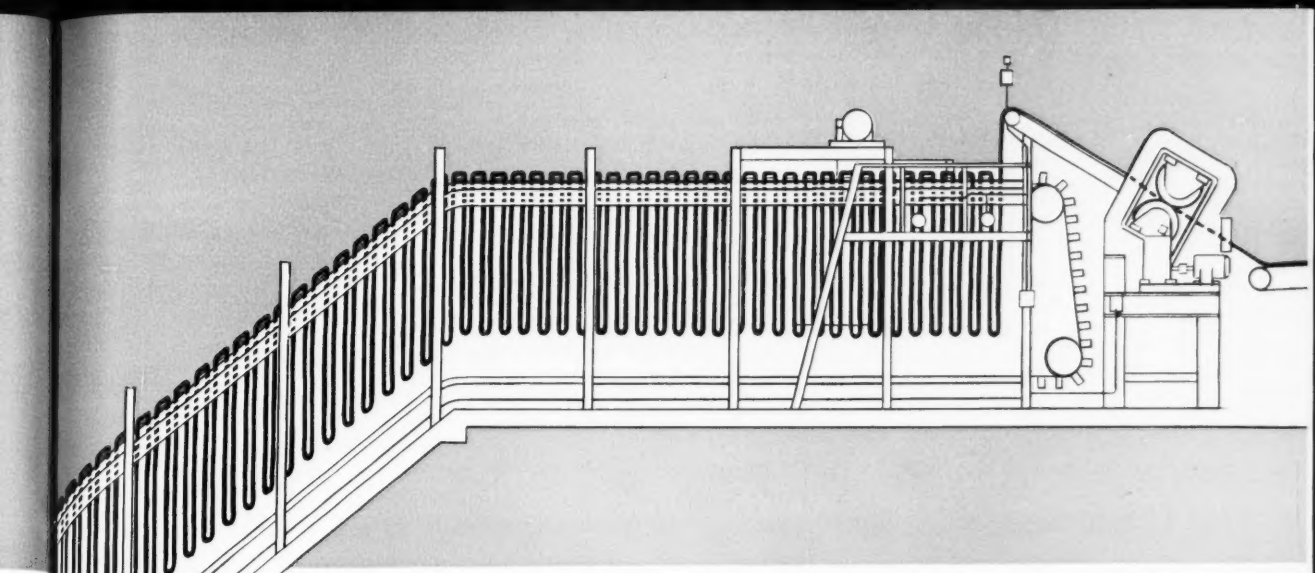


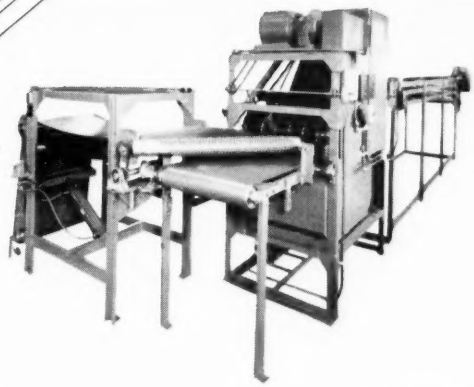
Layout shown above consists of: hinged air operated banbury dump mill take-off conveyor; stock marking unit; splicing unit connecting the individual batches into a continuous strip; mist precooling, lubrication; drying and cooling festoon rack; and rotary slab cutter. This is a special layout to take the stock from the first floor to the mezzanine or second floor, cooling and drying at the same time before reaching the cutter at the unloading end of the fixed bar festoon rack.



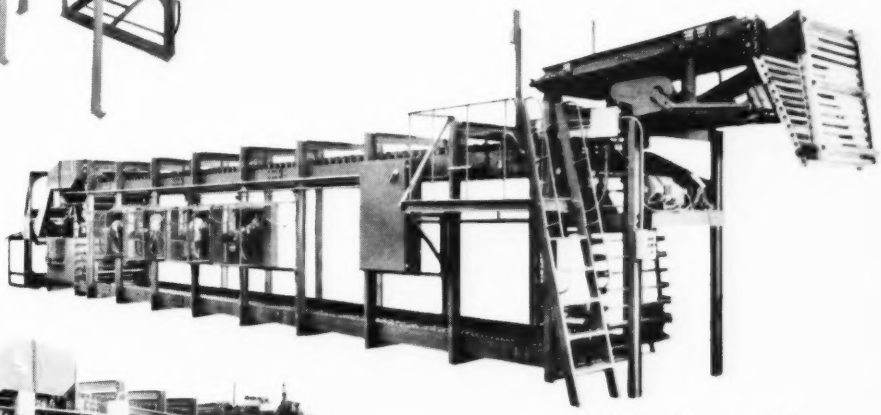
MAJOR SUPPLIER OF COOLING EQUIPMENT FOR THE RUBBER INDUSTRY

We Engineer to meet your special needs

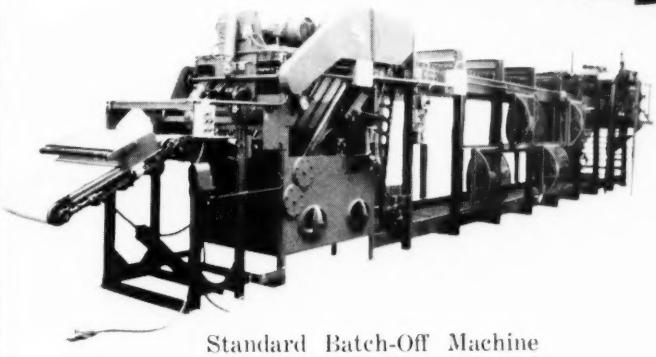




The right angle turning device for installations where there is limited space directly in front of the banbury dump mill.



Batch-Off Machine with Wig-wag Stacking Unit.



Standard Batch-Off Machine with Take-Off Conveyor and Strip Splicer.

Complete engineering and design assistance availal to help you in your stock cooling and handling pro lems. Standard equipment available for handli many stock widths consisting of mill knives, m take-off conveyors, lubrication of stocks, cooli conveyors and festoon racks, stock printing a marking devices, strip splicing, automatic 90 tur ing units, automatic cutting, stacking and skid ha dling systems.

the akron standard mold company

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Call Hall

HALLCO NEWS

Issued by
The C. P. Hall Co.
Chemical Manufacturers

No. 12

SAVE UP TO 30% WITH LE-46 RUBBER MOLD RELEASE AGENT

Tire and mechanical goods manufacturers report savings up to 30% by using LE-46, the high viscosity silicone oil emulsion release agent. LE-46 gives a more substantial, stable, and durable film at mold temperatures. It also lends itself to automatic spray equipment because it "flats out" far better than other rubber mold release agents. LE-46 is manufactured by the Union Carbide Corporation, Silicones Division, and is distributed by The C. P. Hall Company. Samples available on request.

LOW TEMPERATURE PLASTICIZER FOR VINYL AND RUBBER

Dioctyl Azelate C-498 is an ester-type technical grade plasticizer. It is low in volatility and in water extractions. C-498 provides excellent light and heat stability and is highly recommended for use with calendered films, sheets, coated films, dispersions, plastisols, and extrusions. Manufacturers' reports show it is ideal as a softening agent for synthetic rubbers, especially the nitrile type. Manufactured by The C. P. Hall Company. Samples available on request.

Be Accurate: Call it PARA-FLUX® only if it came from The C. P. Hall Company.

AKRON	CHICAGO	MEMPHIS	LOS ANGELES	TORRANCE, CALIF.	NEWARK
Phone JEfferson 5-5175	Phone POrtsmouth 7-4600	Phone JAckson 6-8253	Phone SPruce 5-6666	Phone FAirfax 0-2211	Phone MItchell 3-2614

use CLIMCO LINERS for foolproof storage of gum rubber sheets

Climco stock protection helps you do away with risky guesswork . . . Climco Processed Liners preserve sheet stock by excluding air, moisture and sunlight to stop oxidation, mold and bloom. Tackiness is wholly preserved; lint and ravelings are eliminated. Climco Liners are recommended for easier, more efficient *horizontal* storage – vertical storage tends to curl the edges of stock and liner, causing damage and loss.

Since 1922, Climco has offered these benefits and more. Better separation saves power and eliminates production headaches. Users of non-sticking Climco Liners find greater latitude in compounding and longer liner life, increased tensile strength and lasting flexibility. The final result is measured in profit – Climco Processing has done it for others, Climco Processing can do it for you. Call Climco for trial today.

THE CLEVELAND LINER & MFG. CO.
5508 Maurice Ave. • Cleveland 27, Ohio • U.S.A.
Cable Address: "BLUELINER"

FREE BOOKLET
Send for the complete story today on Climco Processing.

CLIMCO
PROCESSED LINERS AND LINERETTE INTERLEAVING PAPER

Creative thinking at Copolymer develops New and Better products for the Rubber Industry

AND THIS MAN KNOWS WHY!

He's Development Manager MARTIN E. SAMUELS . . . and he knows that much of Copolymer's leadership in the rubber industry is due to its ability to shape, develop and deliver a superior product.

A member of the original team which helped Copolymer begin operation in 1943, MARTIN is a persistent explorer who gets first-class results from intangible concepts . . . and he considers it a personal challenge to create new and useful products from "impractical" ideas.

His experience and creativity are part of the overall optimistic environment which *is* the Copolymer team.

MARTIN SAMUELS knows from experience that Creative Thinking at Copolymer will continue to benefit customers . . . pioneering in new ways to improve product quality and uniformity, and in new ways to provide more meaningful technical services.

Since its beginning, Copolymer and its progressive attitude have continued to benefit the rubber industry with some of the greatest advances in product discovery and improvement.

Being a member of Copolymer's original team has enabled MARTIN SAMUELS to participate in and watch the developments which have helped Copolymer grow to its present position of leadership.

MARTIN was with Copolymer when it became the FIRST plant to reach and exceed its design capacity during World War II — when all synthetic plants were government-owned.

He saw Copolymer become the FIRST to realize the full potentialities of "cold rubber," and FIRST in its continuous full-scale production.

And, as Copolymer grew, MARTIN was there when it became the FIRST to develop and commercially produce concentrated cold rubber latex for foam rubber.

He was there when Copolymer made rubber history as the FIRST to develop and produce a superior carbon black masterbatch without the use of a chemical dispersing agent.

And, hundreds of Copolymer customers also know from experience that the Copolymer name means a

QUALITY PRODUCT
PACKAGED WELL—
DELIVERED PROMPTLY

Copolymer

RUBBER & CHEMICAL CORPORATION
Phone: Elgin 5-5655 P. O. Box 2591, Baton Rouge, Louisiana

Your Copolymer representative can help you with a recommendation of the best Copolymer product for your manufacturing use.

CONTACT ONE OF THESE COURTEOUS, COMPETENT SALES REPRESENTATIVES, TODAY!

M. D. "Skip" Morris	Akron, Ohio WAlbridge 8-3226
William L. "Bill" Ferguson	Akron, Ohio WAlbridge 8-3226
Grant Rickard	Atlanta, Georgia PLaza 3-7838
B. G. Hutchison	Chicago, Illinois SKyline 5-7095
A. E. "Art" Bailey	Hartford, Connecticut CHapel 7-5731
	Philadelphia, Pennsylvania LOcust 3-4663
West Coast Representative	
B. E. "Bert" Dougherty	Los Angeles, California MAdison 4-9511
	San Francisco, California YUkon 6-5493

Are you stuck?

for an efficient processing agent that allows a free flow at a higher solid content in rubber cements and rubber compounds?

THEN WE SUGGEST YOU USE

DEGELL

REDUCES VISCOSITY FOR EASIER PROCESSING AND GREATER UNIFORMITY OF RUBBER CEMENTS AND OTHER RUBBER COMPOUNDS

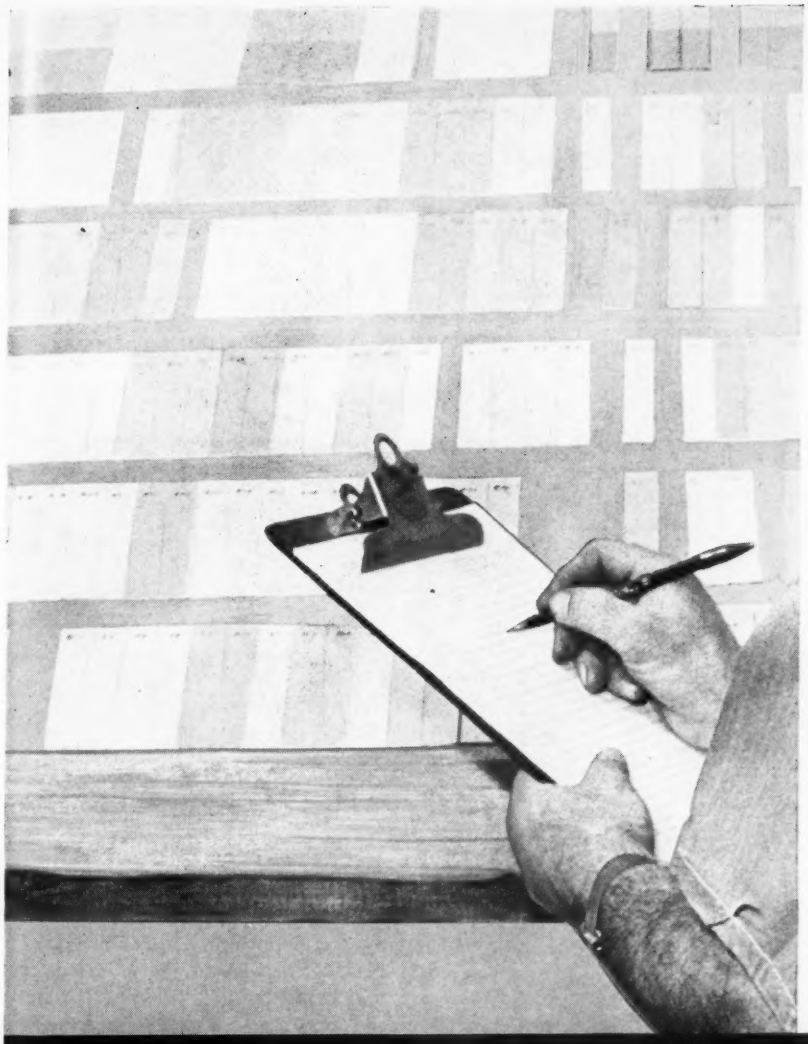
- ✓ **DEGELL** plasticizes and softens
- ✓ **DEGELL** helps eliminate settling and sludging
- ✓ **DEGELL** helps prevent scorching
- ✓ **DEGELL** helps eliminate gelling and ropiness
- ✓ **DEGELL** maintains viscosity at a higher concentration

Use for Natural, Synthetic, and Reclaimed Rubber Compounds

Detailed literature on DEGELL is available

BEACON Chemical Industries, Inc.

33 Richdale Avenue, Cambridge 40, Mass.



THE PENNOX SERIES

General purpose amine-type

PENNOX A—Slightly discoloring amine-type antioxidant effective in both dry rubber and latex. Provides good high temperature aging in latex.

Nonstaining, nondiscoloring phenolic types

PENNOX B—Good antioxidant for Hevea and SBR vulcanizates and raw SBR polymer.

PENNOX C—Exceptionally resistant to discoloration in light-colored latex products; provides good protection for Hevea and SBR vulcanizates.

PENNOX D—Excellent antioxidant for latex products, dry Hevea and SBR compounds.

For effective age resistance Pennox Antioxidants

In the Pennox series you'll find a dependable age resister suitable for most rubber compounding situations. Pennox antioxidants protect Hevea and SBR vulcanizates, raw SBR polymer, and latex products from the deteriorating effects of heat and oxidizers . . . also provide superior gas fading protection for latex, and minimize discoloring of fabrics coated or used in contact with latex products.

For detailed information on the Pennox series, write or ask your Pennsalt representative for Bulletin S-151, Pennox Antioxidants; and Bulletin S-152, Pennox Antioxidants for Latex. Evaluation samples available on request.

Pennox is a trade name of Pennsalt Chemicals Corp.

See our complete listing in Chemical Materials Catalog

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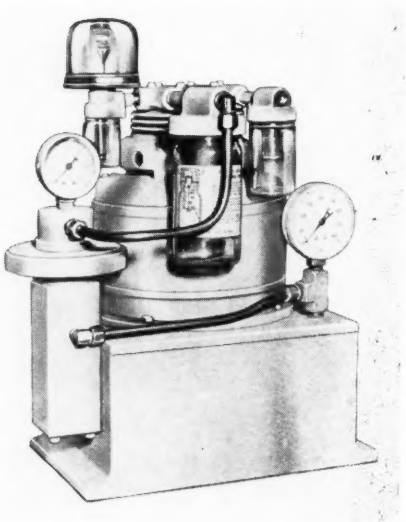
new equipment

(Continued from page 22)



Model PH-55 hydraulic web guide

Hydraulic Web Guide

Stanford Engineering Co., Salem, Ill., is marketing the Model PH-55 hydraulic web guide with automatic pilot control, which, the company says, has been precision-designed for greater speed, accuracy, and economy in processing rubber, paper, foil, plastics, textiles, and other web materials.

Owing to the special design of the pilot control, no adjustments are needed, and the problems of "chattering" and "hunting" are eliminated, the firm reports. The PH-55 features pinpoint precision through simple, straightforward design, making possible positive web corrections to within plus or minus 0.010-inch, the manufacturer further states. The power unit is completely integrated, containing an oil reservoir, oil pump, motor, and air source for pressure or vacuum sensing head. The unit is available for various working pressures to meet practically any requirements of even the heaviest loads.

The Consistometer

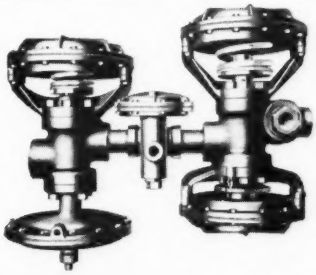
The Consistometer, a viscosimeter for use on substances whose rheological properties cannot be investigated with rotary, capillary, or falling ball instruments, has been developed by Brinkmann Instruments, Inc., Great Neck, N. Y. Measurements can be made on materials such as natural and synthetic resins, rubber, fillers, and primers to determine properties including Newtonian viscosity, structural viscosity, plasticity, elasticity (instant and delayed recoil), and hardness.

Solve your fluid control problems with

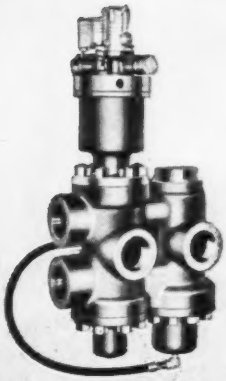
SINCLAIR-COLLINS

Diaphragm-Operated Valves

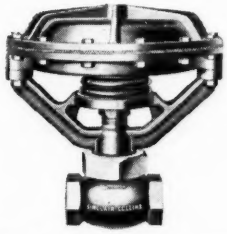
300 PSI, 3-WAY OR REVERSE ACTING bridge yoke, triple-guided stem, ¼ - 3 in. NPT.



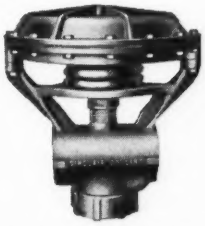
4,000 PSI, 3-WAY AUTOMATIC 2-pressure, auto-neutral, throttling, ½ - 3 in. NPT.



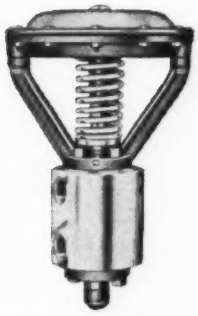
3,000 PSI, 4-WAY SEMI-AUTOMATIC air operated, handles oil, water, glycol-base fluids, 1 - 2 in. NPT.



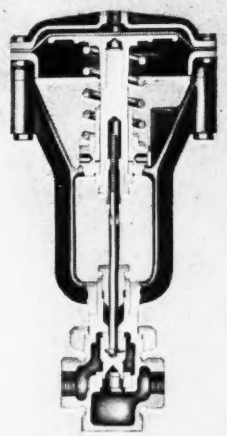
150 AND 300 PSI, DIRECT ACTING globe body, top-guided stem, ¼ - 3 in. NPT.



150 PSI, 3-WAY OR REVERSE ACTING, ¼ - 3 in. NPT VACUUM, 2-WAY, 1 - 3 in. NPT compact design, positive sealing, bridge yoke.



4,000 AND 6,000 PSI, 2 AND 3-WAY BALANCED NC or NO, pressure above or below seats, ½ - 2 in. NPT.



250 PSI, 2-WAY V-PORT MODULATING controls temperature, pressure or flow, direct or reverse acting, ½ - 2 in. NPT.

FOR HOT OR COLD RAW WATER, OIL, AIR, STEAM SERVICE
2, 3, AND 4-WAY • SINGLE OR TWO PRESSURE
HIGH OR LOW PRESSURE • AIR OPERATED
AUTOMATED OR REMOTE MANUAL CONTROL
IDEAL FOR CENTRAL RAW WATER HYDRAULIC SYSTEMS

Chances are, you'll find the answer to your control valve problems in Sinclair-Collins' line. Sound design and highest quality construction . . . Stellite stem seats, Monel stems, hardened replaceable body seats, heavy-duty bronze, ductile iron or cast steel bodies . . . these and many other features assure leak-free performance . . . resistance to corrosion . . . elimination of seat wire drawing . . . longest service life.

For application engineering recommendations, contact your nearby Sinclair-Collins field engineer.

For more information, write for Bulletin SC-59. Address The Sinclair-Collins Valve Company, Akron 11, Ohio, Dept. RW-901.

The SINCLAIR-COLLINS VALVE Co.
DIVISION OF INTERNATIONAL BASIC ECONOMY CORPORATION (IBEC)
AKRON 11, OHIO

8129

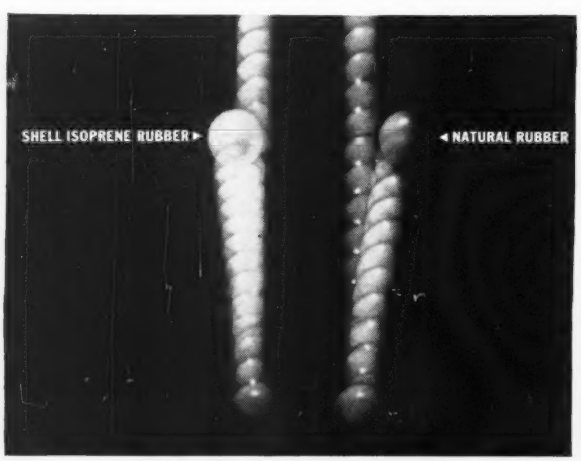
REPORT:

Shell reports on its synthetic rubber—tells what is new and how to get technical assistance

Shell makes SBR and polyisoprene at its Torrance plant. Read about these polymers and how Shell's Technical Service laboratories can help you use them profitably.

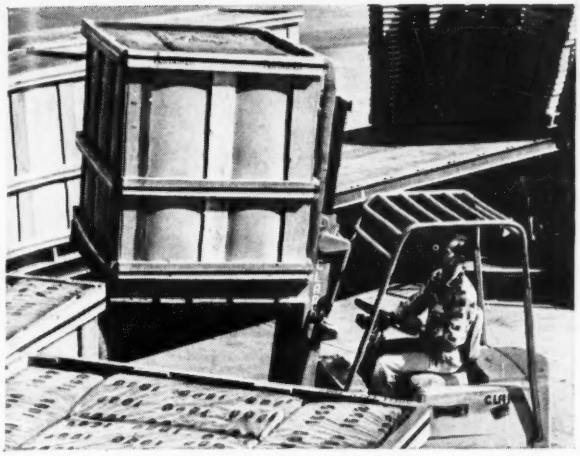
1. SBR for all applications. Shown above is a hot, nonpigmented, nonstaining polymer ready for shipment. Shell Chemical also makes cold polymers, black masterbatches, oil-extended polymers, oil-black and resin-rubber masterbatches.

2. Both hot and cold SBR latices are made by Shell. A wide range of properties permits their use in dozens of applications such as foam cushioning, carpet backing and tire cord dippings. Above, a 10,000-gallon latex tank car being filled.



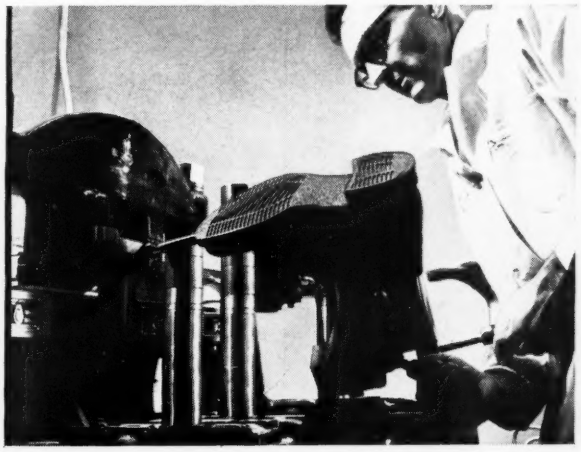
3. New Shell Isoprene Rubber. First commercially made synthetic to duplicate the molecular structure of natural rubber. This includes high resilience as shown above. Note: An oil-extended grade of polyisoprene is now available.

4. Shell's Torrance plant. This Shell Chemical plant, in Torrance, California, is the only fully integrated SBR plant in the United States. Here, Shell makes butadiene, (A), styrene, (B), and polymerizes these, (C), into copolymers.

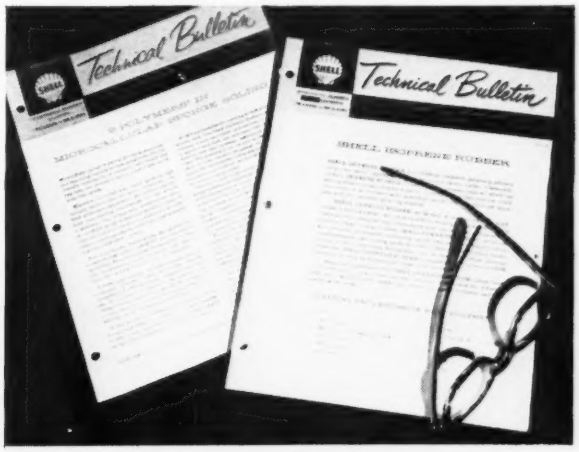


5. Stops cold flow—saves space. These are two advantages of this Flotainer® package—a lightweight container developed by Shell. Handles easily with fork lift, as shown. Holds 42 bales. Stores up to 30 tons on 100 square feet of floor space.

6. Warehouses in 7 cities stock Shell Isoprene Rubber and popular SBR types. Mixed loads can be on their way to you in hours. Call the Shell Synthetic Rubber sales office in Stamford, Conn., Cleveland, Ohio or Lakewood, Calif.



7. Shell's Technical Service constantly seeks new ways to use rubber more effectively and profitably. In our photo, a chemist completes a mold-on sole. Work like this pays off in new polymers and processing methods for hundreds of items.



8. Latest developments are reported by Shell's Technical Service Department in Bulletins such as these. They include new formulas and techniques for compounding and processing Shell polymers. To receive them, use coupon below.

9. New Shell catalog, above, contains full information on all Shell SBR polymers, latices and new Shell Isoprene Rubber. It also lists technical bulletins that can help you solve costly problems. For a copy, clip the coupon on the right.

Shell Chemical Company
Synthetic Rubber Division
P. O. Box 216
Torrance, California

SHELL

☐ Please place my name on mailing list for Shell Technical Service Bulletins.

Please send me _____ copies of Shell's new catalog.

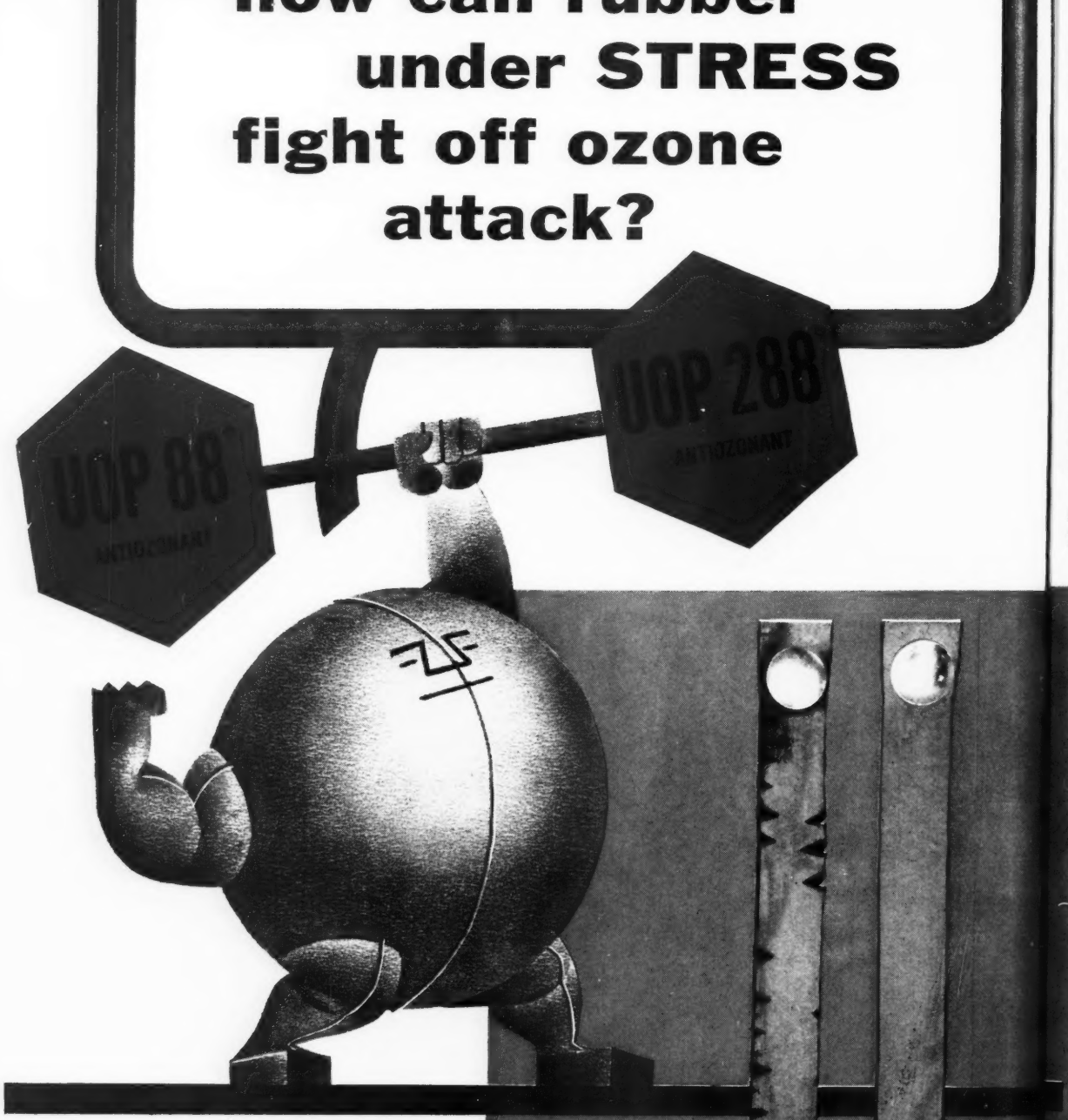
Name _____ **Title** _____

Company _____

Street _____

City _____ **Zone** _____ **State** _____

how can rubber under STRESS fight off ozone attack?



The two test strips at right, both of identical composition including kind and amount of antiozonant, were exposed to 30 pphm ozone at 100° F for 2 weeks at different elongations.

This specimen subjected to 20 percent elongation shows severe ozone cracking.

Specimen subjected to 10 percent elongation shows no sign of ozone cracking.

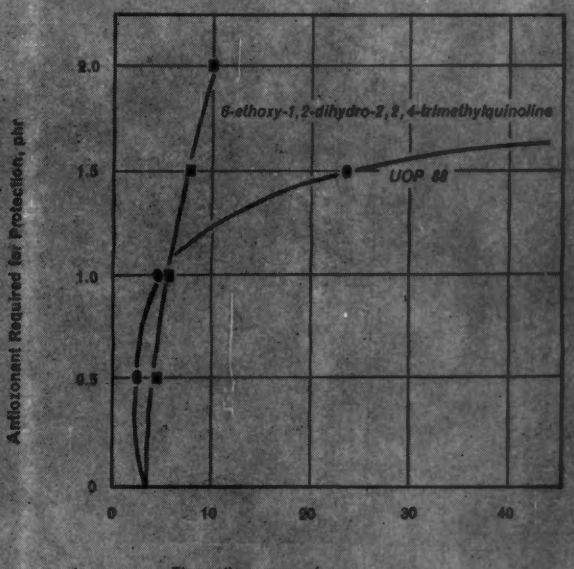
properly formulated, rubber can withstand ozone, even under severe dynamic service . . .

What happens to a well formulated rubber compound when the vulcanized product is subjected to inherent or applied stresses?

The photos of test strips below give a graphic answer: Ozone attacks the surface of the product and severe cracks develop.

Hence the need for special ozone protection in products likely to be subjected to such service. And special protection means the kind provided by UOP 88 and 288. Unlike other protective measures, UOP antiozonants extend their protection to products under heavy physical stress and dynamic flexing. With a relatively small increase in amount, you can give your product sufficient ozone protection to withstand greatly increased stresses.

In working out rubber formulations involving the use of antiozonants avail yourself of UOP technical service and facilities. Just write or telephone our Products Department.



Curves plotted for UOP 88 and a competitive antiozonant show that while antiozonant requirement increases with increased strain, it does so at a far lower rate for UOP 88 than for the competitive material.

To cover all phases of service conditions, UOP rubber labs conduct dynamic and static tests both indoors and outdoors:

DeMattia flexer is used to evaluate flex-cracking properties of compounds tested in UOP rubber laboratory.

UOP ozone cabinets provide test conditions at a wide range of ozone concentrations.

Test specimens mounted on outdoor racks are examined at regular intervals for evidence of deterioration.

UOP® **UNIVERSAL OIL PRODUCTS COMPANY**
30 Algonquin Road, Des Plaines, Illinois, U.S.A.

new products

Two New Goodyear Tires

The Goodyear Tire & Rubber Co., Akron, O., is marketing a new low-cost passenger tire and an improved pneumatic industrial tire.

The passenger tire features a wider tread with a zig-zag design for increased traction. A longer-wearing tread and stronger nylon cord body are also claimed.

The industrial tire has a new cut-resistant tread compound which is up to 60% thicker than conventional tires, increasing its value where extreme durability service is required.

Freight Shock Absorber

Sqair-Pak dunnage bags, which act as resilient air columns between sections of heavy, but fragile loads, were announced by B. F. Goodrich Aerospace & Defense Products, Akron, O.

The rubberized fabric bag with its unique square-corner construction and exclusive bellows-like internal reinforcement, which controls bag expansion, can be inflated in minutes with an air hose and portable compressor.

The two new features combine to retain the desired rectangular shape of the bag under all working pressures, apply pressure uniformly across entire load, and exert more gripping surface than other bags, it is claimed.

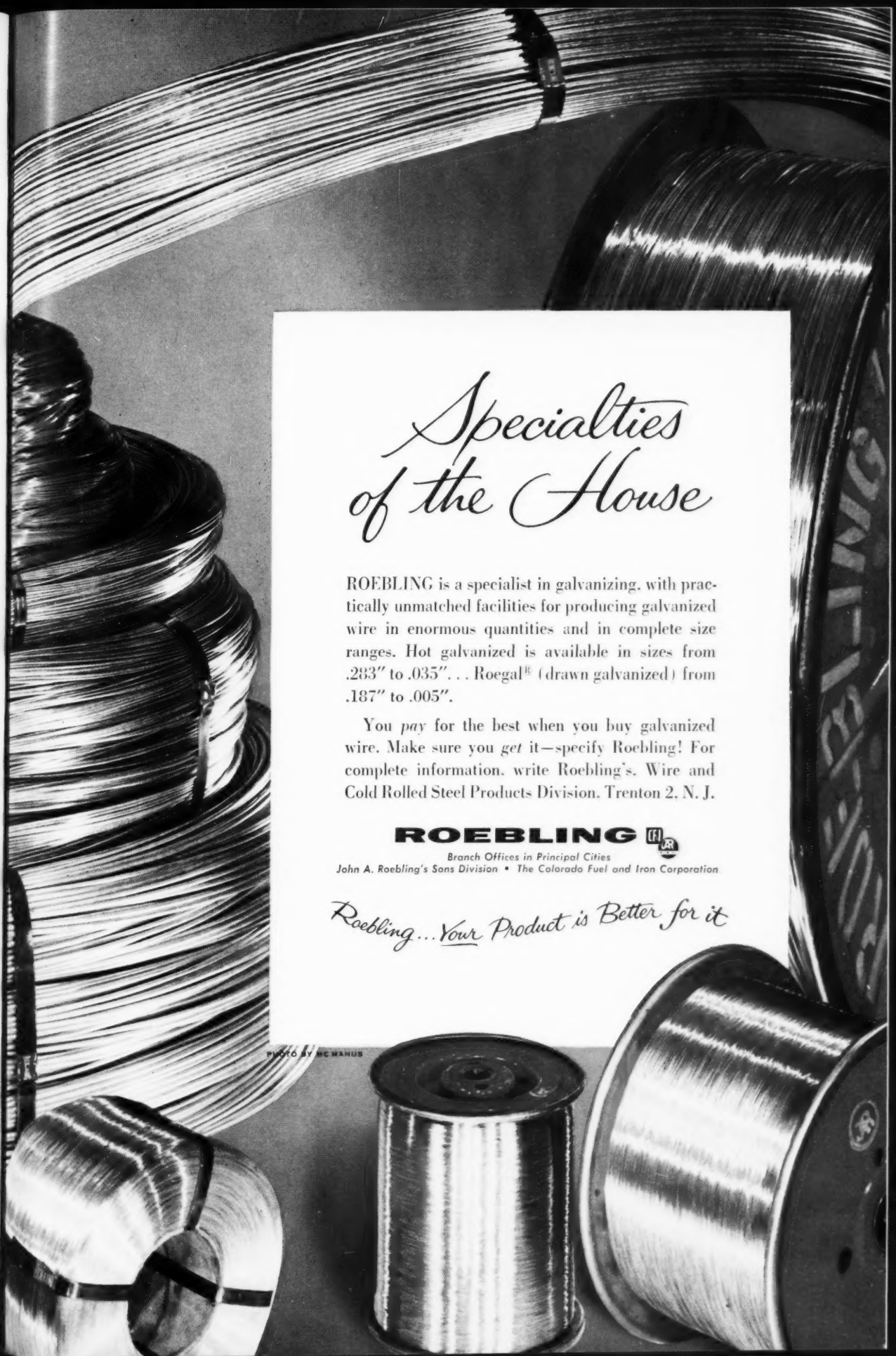
The Sqair-Pak bags operate efficiently in an expansion range between six and 24 inches and are available in standard sizes from 24- to 48-inch widths and 60- to 108-inch lengths.

Substantial savings in shipping costs have been determined over conventional methods, according to the company.

Tubeless Tire Repair Plugs

The Gross cap seal plug system for repairing nail holes in tubeless tires has been patented by Gross Mfg. Co., Inc., Monrovia, Calif. Nail holes in tubeless tires can be repaired in 60 seconds or less without the tire being removed from the car. The kit consists of a unique set of tools: probe, guide, and plunger, as well as the tough rubber cap seal plugs and a sealer lubricant.

(Continued on page 46)



Specialties of the House

ROEBLING is a specialist in galvanizing, with practically unmatched facilities for producing galvanized wire in enormous quantities and in complete size ranges. Hot galvanized is available in sizes from .283″ to .035″. . . Roegal® (drawn galvanized) from .187″ to .005″.

You *pay* for the best when you buy galvanized wire. Make sure you *get* it—specify Roebling! For complete information, write Roebling's. Wire and Cold Rolled Steel Products Division, Trenton 2, N. J.

ROEBLING

Branch Offices in Principal Cities
John A. Roebling's Sons Division • The Colorado Fuel and Iron Corporation

Roebling... Your Product is Better for it

problem: Increase compression of carpet foam, without increasing cost

solution: FIRESTONE TECHNICAL SERVICE AND FR-S® 200 HS

Heavy traffic was putting a dent in the product of one foam-on-carpet manufacturer. The obvious way to get more rebound and resistance in the foam would be to add more natural or synthetic latex. But that would increase the cost!

Firestone Technical Service solved the problem by recommending the use of FR-S 200 HS Latex, a remarkable new polymer from Firestone's Research Laboratories. The result: greater resilience for a given weight of foam, *no* added cost.

FR-S 200 HS in carpet backing provides many of the qualities of natural latex at a stable price . . . faster gel, for instance . . . greater tensile strength . . . maximum tuft-lock . . . over 68% solids and high pigment loading.

If you have a problem that may concern synthetic latex, call in your Firestone Technical Service Man. Or write direct to Firestone (Dept. 21-5) the world's most experienced manufacturer of synthetic rubbers and latices. Chances are that Firestone chemists will be able to help you.

Firestone's Diene rubber plant is in full commercial production.

Firestone

SYNTHETIC RUBBER & LATEX CO.

AKRON 1, OHIO

MAKING THE BEST TODAY STILL BETTER TOMORROW

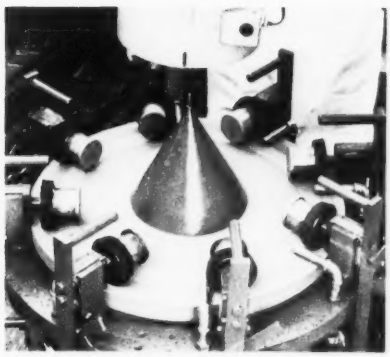
MEET FRED MYERS – United Carbon District Sales Manager and a man interested in tinkering with automobiles as a hobby.

With automobiles, servicing is one of the keys to better performance.

Service is also the key to top performance in the best interests of our customers.

SHIRTSLEEVE SERVICING

United Carbon maintains a complete, up-to-date service laboratory in Akron, Ohio. Its purpose is to help ensure that each of the company's masterbatches performs exactly as it should in applications for which tailored.



Each new masterbatch formulation made by United Carbon is put through a thorough series of tests to determine characteristics in practical applications. Pictured is an angle abrader, just one of over 50 pieces of modern testing equipment in the lab.

A black masterbatch is only as good as its performance—in processing and in final rubber product use. United Carbon provides its customers this performance assurance through work at its Akron Service Laboratory.

Every year many hundreds of tests are run on the company's BAYTOWN black masterbatches to determine both processing characteristics and end-use durability. No masterbatch formulation is released to a customer until it has proven itself under all conditions.

By insisting on rolling up its sleeves and providing this service, United Carbon has gained a stature second to none in the rubber industry.

BAYTOWN — The Birthplace of Black Masterbatch

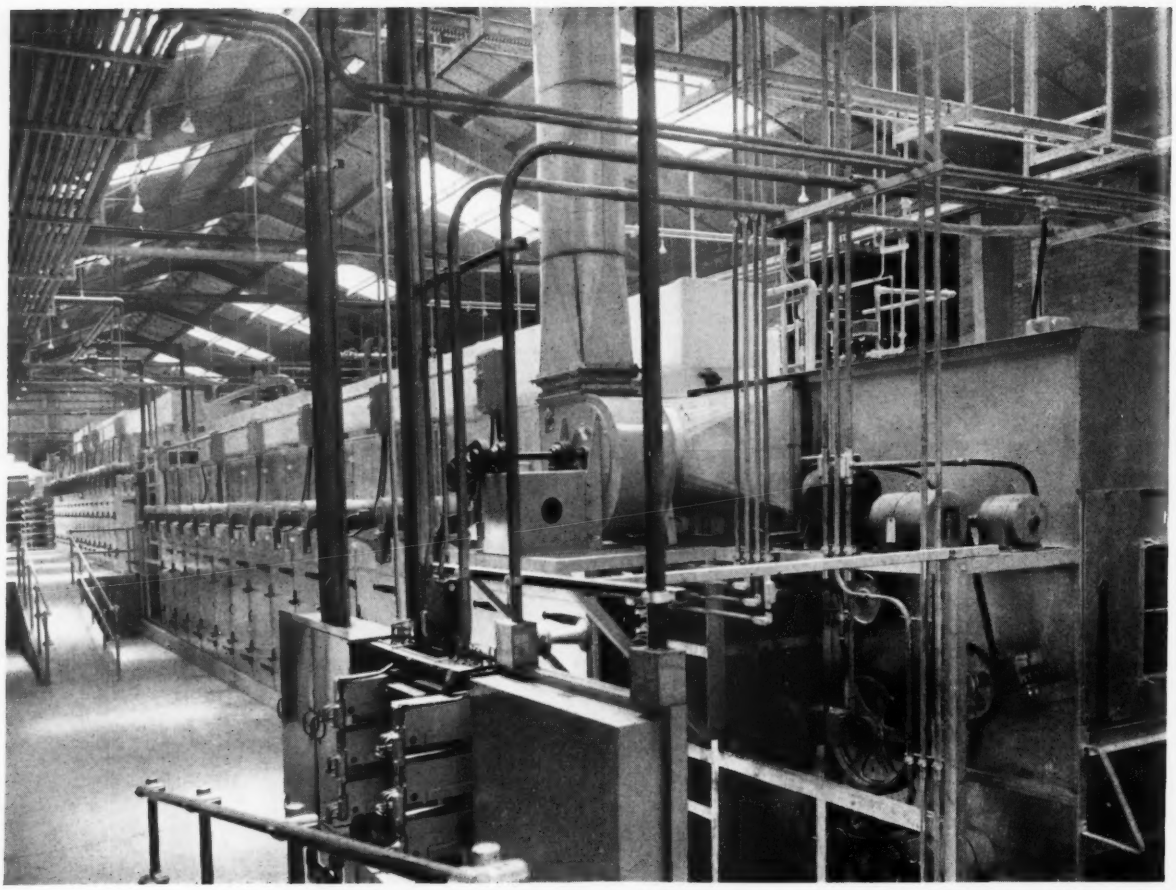
For more information on BAYTOWN black masterbatch and service provided by the Akron Service Laboratory, contact:

UNITED CARBON COMPANY, INC.
410 PARK AVENUE, NEW YORK 22, N. Y.
A Subsidiary of United Carbon Company

AKRON CHICAGO LOS ANGELES
BOSTON HOUSTON MEMPHIS

In Canada: CANADIAN INDUSTRIES LIMITED
In France: UNITED CARBON FRANCE, S.A.

UNITED
CARBON



PHOTO, COURTESY OF UNITED RUBBER & CHEMICAL COMPANY, BAYTOWN, TEXAS

Tomorrow's Dryer...Today!

Full automation, operating efficiency, and the absolute in safety — along with high volume production — were the prime requirements listed by United Rubber & Chemical Company when they were in the market for a new dryer recently. The company's standards are exacting and high . . . they wanted, for their modern plant, a dryer that would be *modern for years to come.*

The large dryer Sargent designed and built for them has full push-button operation and control. Every possible safety device, including explosion and fire prevention, is built into the machine. It is giving United Rubber & Chemical Company absolutely dependable high volume quality production. Installed and operating within five weeks after date of delivery, the Sargent features of unusually rugged construction, economy and simplicity of operation are proving themselves every day.

This 32-section, 2-stage master batch dryer is equipped with vibrating feeder and extra-wide conveyor. It is gas-fired, with each of the six zones having its own separate heating system and temperature regulators and controls. The stock leaves the dryer at less than ½ of 1% moisture content. Full-height hinged doors and easy-to-remove panels, a Sargent feature, provide easy access to entire interior of the machine for quick, thorough cleanout. Each fan assembly, including panel, motor and fan rotor, is easily lifted off by removing four clamps. The Sargent-designed perforated flight conveyor has traveling and stationary stock guides to insure a dustless chain. The Sargent-built "No-Lube" chain never needs lubrication. Velometer ports permit airflow measurement in each zone. No air recirculation through the heaters prevents contamination. Tachometers accurately measure conveyor speeds. Automatic cut-off switches prevent any part of machine starting up accidentally while being cleaned. The entire machine automatically shuts off in case of accidental jamming of conveyor, imminent fire in any section, or other mishap, should it occur.

Another example of Sargent creative engineering to meet individual requirements.

C. G. SARGENT'S SONS CORPORATION

Graniteville, SINCE 1852 Massachusetts

PHILADELPHIA • CINCINNATI • CHARLOTTE • ATLANTA • HOUSTON • DETROIT
NEW YORK • CHICAGO • LOS ANGELES • TORONTO

Nevillac® helps you control the flow of adhesive formulations

One of the advantages gained in the use of Nevillac, Neville Chemical Company's family of hydroxy resins, is greater control of viscosity in adhesives. Depending upon whether you use Nevillac Hard, Nevillac Soft or Nevillac 10°, you will be able to lower molten viscosity to any reasonable degree.

And there are several other good reasons for making Nevillac a part of your formulations. These resins possess a natural ability to bring unfriendly materials into compatible mix, since they are so highly compatible and soluble themselves. This applies to their use with most elastomers, plasticizers and other resins. Nevillac also improves surface adhesion, promotes quick initial grab, improves bond strength and adds resistance to water, acids and alkali. In addition, they possess generally good light stability, permanent thermoplasticity and ease of emulsion. If you formulate adhesives, it may pay you to investigate further.

Write for Technical Service Bulletins No. 72 and 75.

Neville Chemical Company, Pittsburgh 25, Pa.

NEVILLE®

Neville Products

Resins—Coumarone-Indene, Hydrocarbon (Thermoplastic and Heat Reactive), Hydroxy • **Oils**—Plasticizing, Neutral, Rubber Reclaiming, Shingle Stain • **Solvents**—Aromatic (Refined and Crude), Semi-Aromatic (Refined and Crude). • **Antioxidants**—Non-Staining Rubber • **High Purity Indene • Indene Derivatives • Crude Naphthalene.**

new products

(*Continued from page 38*)

Silicone tubing which is made with extremely thin wall

Ultra-Thin Silicone Tubing

Materials Testing Co., Inc., Bethesda, Md., is now producing ultra-thin wall silicone tubing.

Medical-grade tubing with wall thicknesses of 0.004- to 0.006-inch and inside diameters from ½-inch to 3.0 inches is manufactured on order. The sample shown in the picture has a wall thickness of 0.005-inch and an inside diameter of 2½ inches.

A significant accomplishment is based on the fact that manufacturing techniques were evolved using conventional equipment in order to reduce development time.

Ultra-thin wall silicone tubing originated in conjunction with aerospace life science requirements for oxygen and carbon dioxide separation devices.

Temperature Indicators

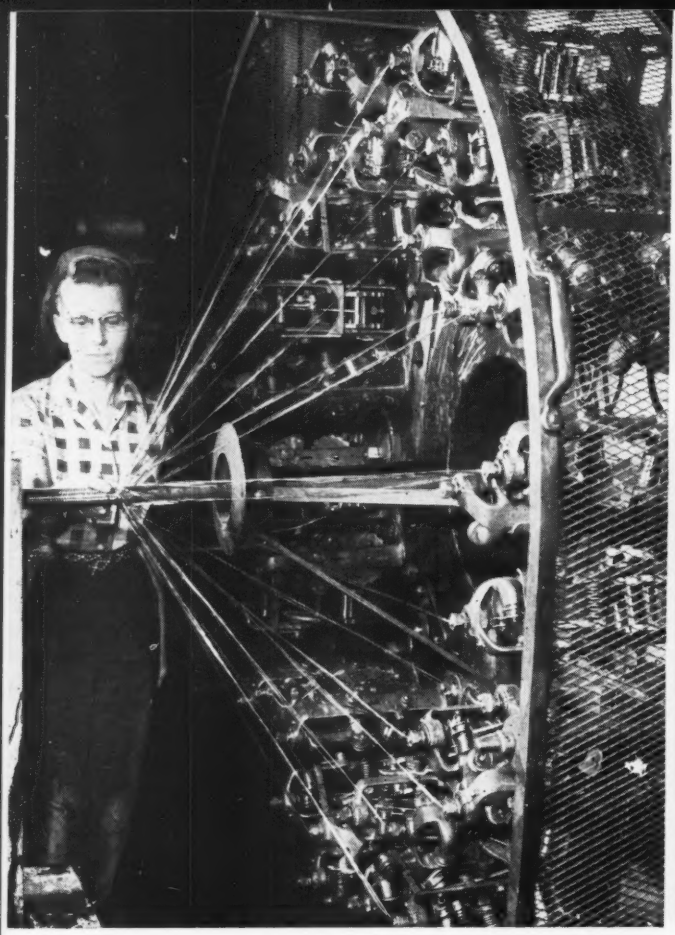
Tempil Corp., New York, N. Y., is adding additional temperature ratings to its Tempilaq and Tempilstik lines. These additions will permit six- or seven-degree steps between 100-350° F. for the Tempilaqs and between 250-325° F. for the Tempilstiks.

Both products offer a convenient and accurate means of determining working temperatures. The Tempilstik series is particularly directed to tire retreaders and the rubber industry in general as a temperature-indicating device.

Urethane Hydraulic Seals

A complete line of urethane hydraulic seals and packings has been introduced for the first time in the United States by Disogrin Industries, Mount Vernon, N.Y.

A specially designed chamfered sealing lip offers immediate and leakproof sealing at low pressures. The high tensile urethane used permits pressure uses of 3,000 to 10,000 psi without back-up rings.



B. F. Goodrich Company braids multiple strands of steel wire into intricate sinews around rubber tube to help control and resist tremendous internal pressures required of flexible hydraulic hose. Wire such as supplied by Johnson has tensile strengths ranging from 240,000 to 400,000 psi.

Firestone Tire and Rubber Company uses only high tensile steel wire of exacting tolerances in building tire beads. Rapidly entering the bead machine in parallel —three to fifteen wires wide, depending on strength specified—the wires are coated with rubber. Clean bronze finish on Johnson wire assures proper rubber adhesion.

The best names in rubber use Johnson wire for strength and safety in tires and hose

The rubber industry has a sound reputation for producing quality products in advance of its needs by use of imaginative research—painstaking development of production methods—careful selection and testing of component materials.

Goodyear—Firestone—U.S. Rubber—B. F. Goodrich—Thermoid and others have established their names over the years by giving the general public and industry alike—strength, safety and durability in products such as long lasting pneumatic tires and tough pressure hose.

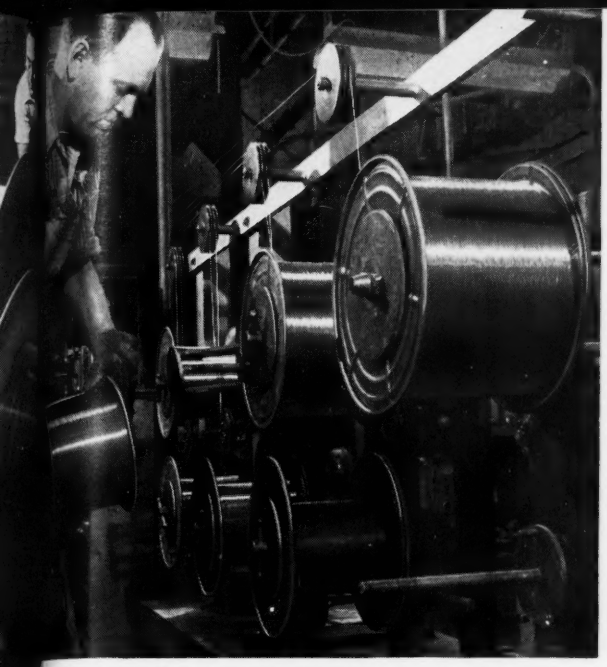
These two products owe their strength in part to the fine steel wires hidden inside them. For it is high-carbon steel bead wire which gives a pneumatic rubber tire—no matter what its size or job, the strength demanded by modern vehicles. Similar wire gives pressure hose its strong sinews which enable it to withstand working pressures as high as 10,000 psi—bursting strength may be three to four times as great.

Take the case of tire bead wire which Johnson supplies to every major tire manufacturer in the country. It is precision-drawn from special high-carbon rods to .037″ in diameter with a tolerance of only .002″—so fine that a 750-pound reel contains 39 miles of wire. Yet, a single strand exceeds 290 pounds of breaking strength equal to a tensile strength of 270,000 psi.

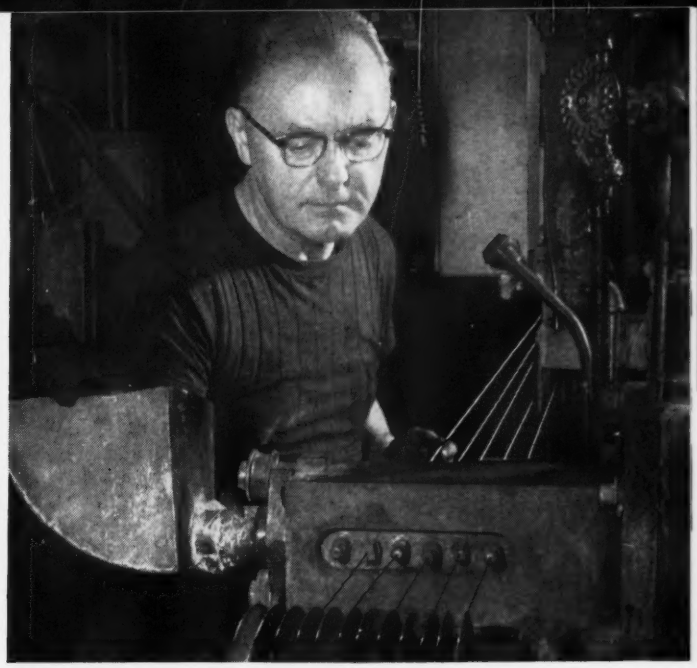
Also the wire must present a clean, unbroken surface and have a good and uniform bronze finish. This finish makes possible tight adhesion between the wire and the rubber surrounding it.

All these qualities contribute to the tire bead strength, help assure the safety of those who ride for work or pleasure on pneumatic tires.

Another special wire made by Johnson for the rubber industry helps rubber hose contain enormous pressures demanded by modern industrial applications. This reinforcing wire is drawn from selected high-



Thermoid Division, H. K. Porter Company, has cut wire rewind loss to ½ of 1% by use of Johnson Discard-a-Spool which eliminates overlaps and tangles, protects wire quality in shipment. The one-way disposable spool weighs only 28 ounces vs 200 ounces for standard spool—slashes tare weight 14 times.



United States Rubber Company wires tires for strength on this bead building machine. The strength comes from the steel wire bead in the edge of each tire. Johnson makes special high-carbon steel wire—.037″ in diameter with tolerance of only .002″ for U.S. and other major tire companies.

carbon steel in diameters ranging from .008″ to .020″ and has exceptional dimensional accuracy—tolerance is plus or minus .0005″.

Johnson hose reinforcement wire is supplied with a special liquor finish to provide maximum adhesion of steel to the rubber which fills the interstices between braids.

The wire is uniformly cast to make possible even spooling and has uniform tensile strength to prevent breaking under the working tension.

These excellent wire qualities, plus careful packaging and prompt delivery, have resulted in Johnson becoming a prime supplier to the rubber industry for hose reinforcement wire.

The outstanding performance of Johnson wire in the rubber industry is typical of the experience in other industries where Johnson supplies aircraft cord wire, armature binding wire, wire for brushes, metal stitching, preformed staple wire, bobby pin wire, rope wire, oil tempered and MB hard drawn spring wire, and music spring wire in a wide variety of sizes and finishes.

If you use specialty wires, call one of the offices listed to right and explore the advantages of Johnson quality which combines strength with economy.

The Goodyear Tire & Rubber Company finds that Johnson meets their exacting requirements for tire bead wire which has high tensile strength, twisting strength, elongation and special surface finish. Here parallel tire bead wires uncoil evenly into a bead building machine.

Johnson Steel & Wire Company, Inc.

Worcester 1, Massachusetts

***a subsidiary of* Pittsburgh Steel Company**

Grant Building • Pittsburgh 30, Pa.

DISTRICT SALES OFFICES

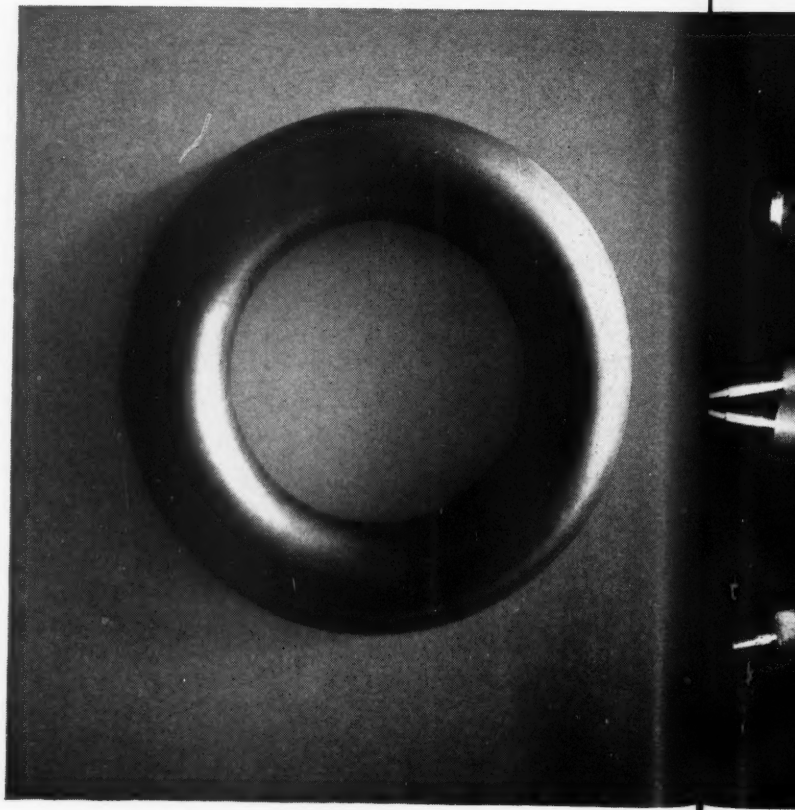
Akron	Cleveland	Detroit	Los Angeles	Pittsburgh
Chicago	Dayton	Houston	New York	Tulsa
			Philadelphia	Warren, Ohio

Steel

WHY POLYSULFIDE CRUDES A

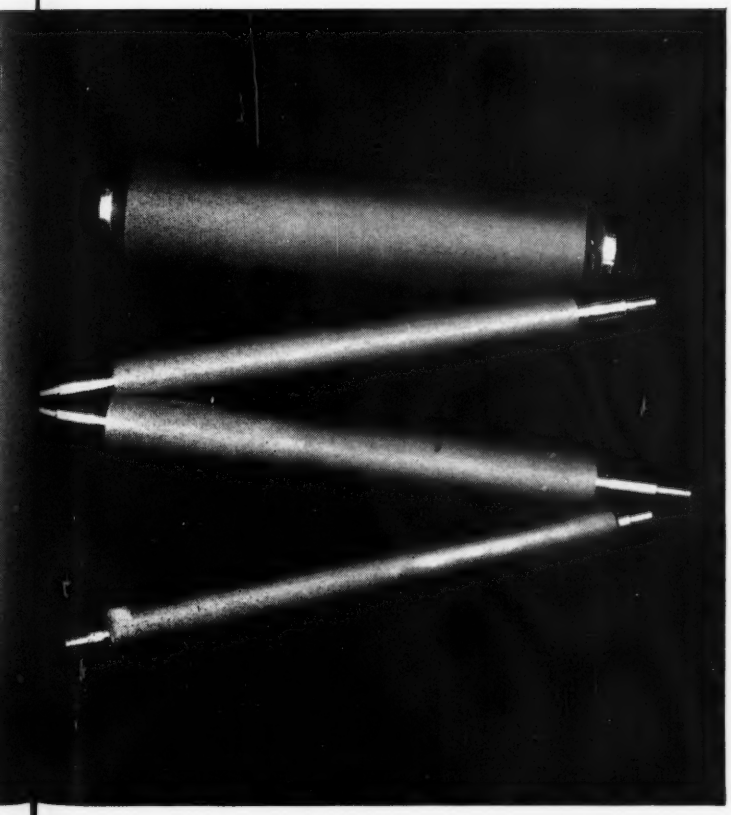
HIGH SOLVENT RESISTANCE. Industry has found no other elastomers perform so well so long under exposure to oils, aromatic fuels, chemicals, solvents and other degrading liquids as THIOKOL polysulfide crudes. Top name manufacturers of paint spray equipment, for example, have made polysulfide rubber the traditional choice for lining hose. As a carrier of paint, solvent, thinners, THIOKOL polysulfide rubber provides trouble-free service years on end.

LOW TEMPERATURE FLEXIBILITY. Though the mercury drops far below zero, polysulfide crudes stand up—without plasticizers. No brittleness. No cracking. No loss of serviceability. In demanding applications such as gaskets and O-rings in aircraft fuel systems, THIOKOL polysulfide rubber keeps its resiliency through the low temperatures of high altitudes. Rubber components, hose, sheeting can be fabricated for service at temperatures to minus 65 deg. F.



ARE PICKED FOR THE BIG JOB

IMPERMEABILITY TO GASES. From sheets of polysulfide rubber or fabrics coated with it, manufacturers of gas meter and regulator diaphragms are producing the most reliable measuring components ever. THIOKOL polysulfide crudes maintain full integrity though constantly exposed to degrading gases, sunlight, ozone, vapors and to wear of diaphragmatic action.



LONG LIFE. Widening use on printing and coating rollers constantly subjected to solvents, thinners and physical stress underscores ability of THIOKOL polysulfide crudes to deliver long service life under severe conditions.

Thiokol offers comprehensive technical literature detailing properties and performance characteristics of polysulfide crudes. Copies of this helpful material will be mailed to you on request. Write on your letterhead, or use handy coupon.

Thiokol®
CHEMICAL CORPORATION

THIOKOL CHEMICAL CORPORATION
780 N. Clinton Ave., Trenton 7, N.J.
In Canada: Naugatuck Chemicals Division, Dominion Rubber Company, Elmira, Ontario

Gentlemen: Please send further information about following properties of polysulfide crudes: ☐ High solvent resistance ☐ Impermeability to gases ☐ Low temperature flexibility

Name_____
Firm_____
Address_____
City_____ State_____

new materials

■

Truflex 300 Vinyl Plasticizer

Thompson Chemical Co., Pawtucket, R. I., is marketing Truflex 300, a primary plasticizer designed to meet the rigid service requirements of high-temperature wire insulation.

Low volatility, excellent heat aging, inherent resistance to moisture, and outstanding electrical properties are features of the material. It blends readily with PVC and is compatible with practically all other plasticizer types.

Other applications considered are in calendered items, coated fabrics, profile extrusions, and organosols.

Rubbapox Adhesive

Rubba, Inc., New York, N. Y., has developed a material that combines the ease of application of a rubber-based adhesive with the best qualities of an epoxy adhesive.

Rubbapox contains neither water nor solvent, requires no mixing prior to use, is easily applied, and cures overnight with bond strength improving for several days. It is waterproof, resistant to acids and alkalies, remains permanently flexible, and gives excellent service from minus 80° to 250° F.

The manufacturer further claims that this adhesive is excellent for fabrication curtain walls and for laminating polystyrene or polyurethane or polyethylene foams to aluminum, steel, and Cycolac. Rubbapox, furthermore, will adhere to almost any surface including some grades of polyethylene, and it can also be used as a calking or waterproof sealer.

Polymeric Plasticizers

Emery Industries, Inc., Cincinnati 2, O., has introduced four new low-cost plasticizers for plastisols, organosols, flooring, coated upholstery fabrics, unsupported films, and other applications.

Plastolein 9722 (formerly Emery 3282-D) offers improved humidity and outdoor aging, compatibility, extraction and migration.

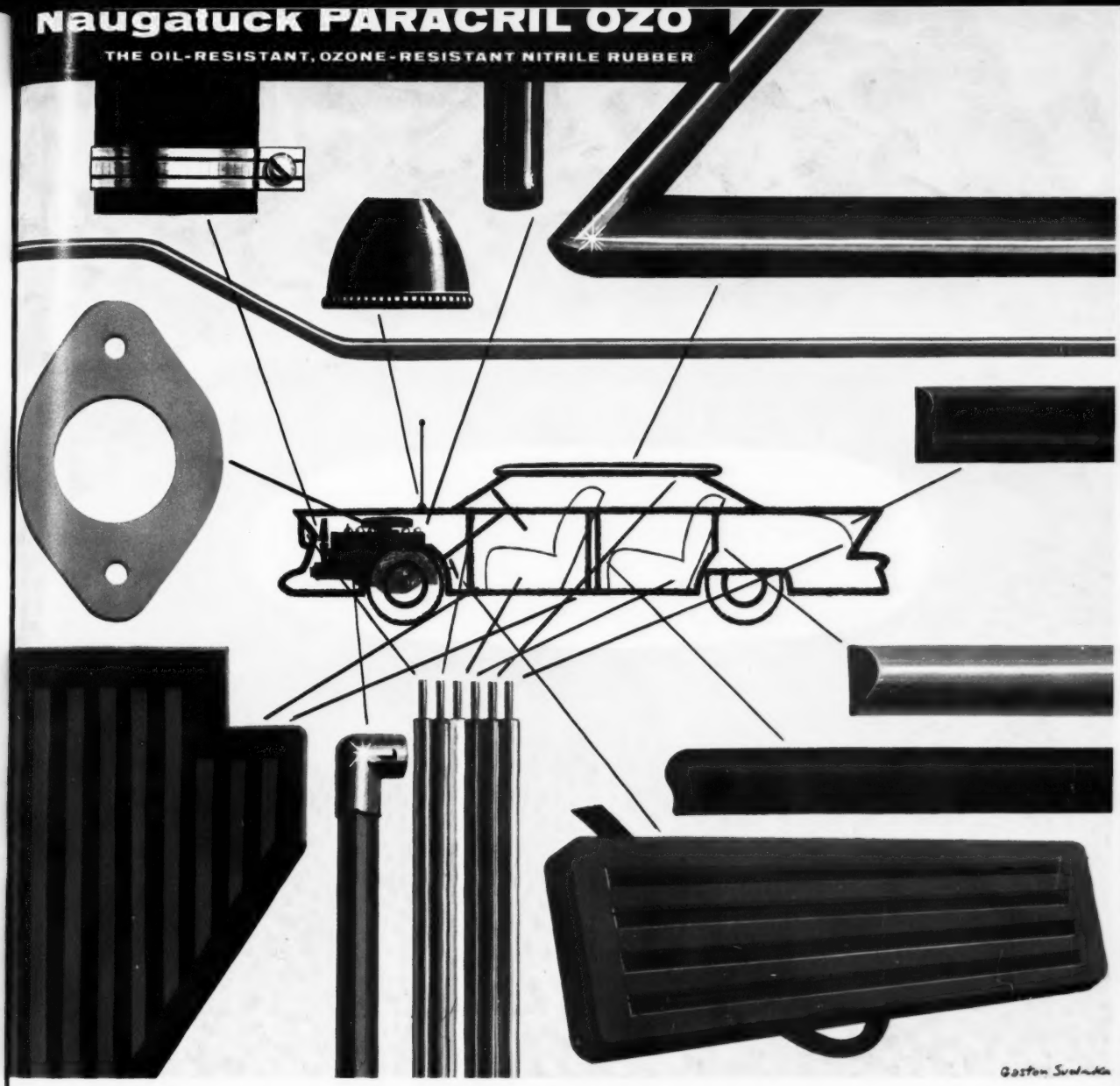
Plastolein 9730 (formerly Emery 3311-D) offers lowest cost, low migration properties, excellent outdoor stability, and good soapy-water resistance.

Plastolein 9750 (formerly Emery 3313-D) is a

(Continued on page 64)

Naugatuck PARACRIL OZO

THE OIL-RESISTANT, OZONE-RESISTANT NITRILE RUBBER



Great new advance in automotive rubber

Here is a new rubber that's unmatched for oil, weather, and abrasion resistance. It's new PARACRIL® OZO, the finest achievement yet in the nitrile rubber field. PARACRIL OZO's properties are tailor made for many modern automotive parts—for everything from weather stripping to oil seals and hose. PARACRIL OZO gives you a whole series of important advantages, including:

- significantly superior ozone resistance
- excellent fuel and oil resistance
- several times greater abrasion resistance
- permanent retention of bright colors for exterior styling and easily traceable wiring and other interior parts

Look into PARACRIL OZO. Discover for yourself its new design possibilities...its unlimited color...its high quality. Contact your nearest Naugatuck representative at the address below.

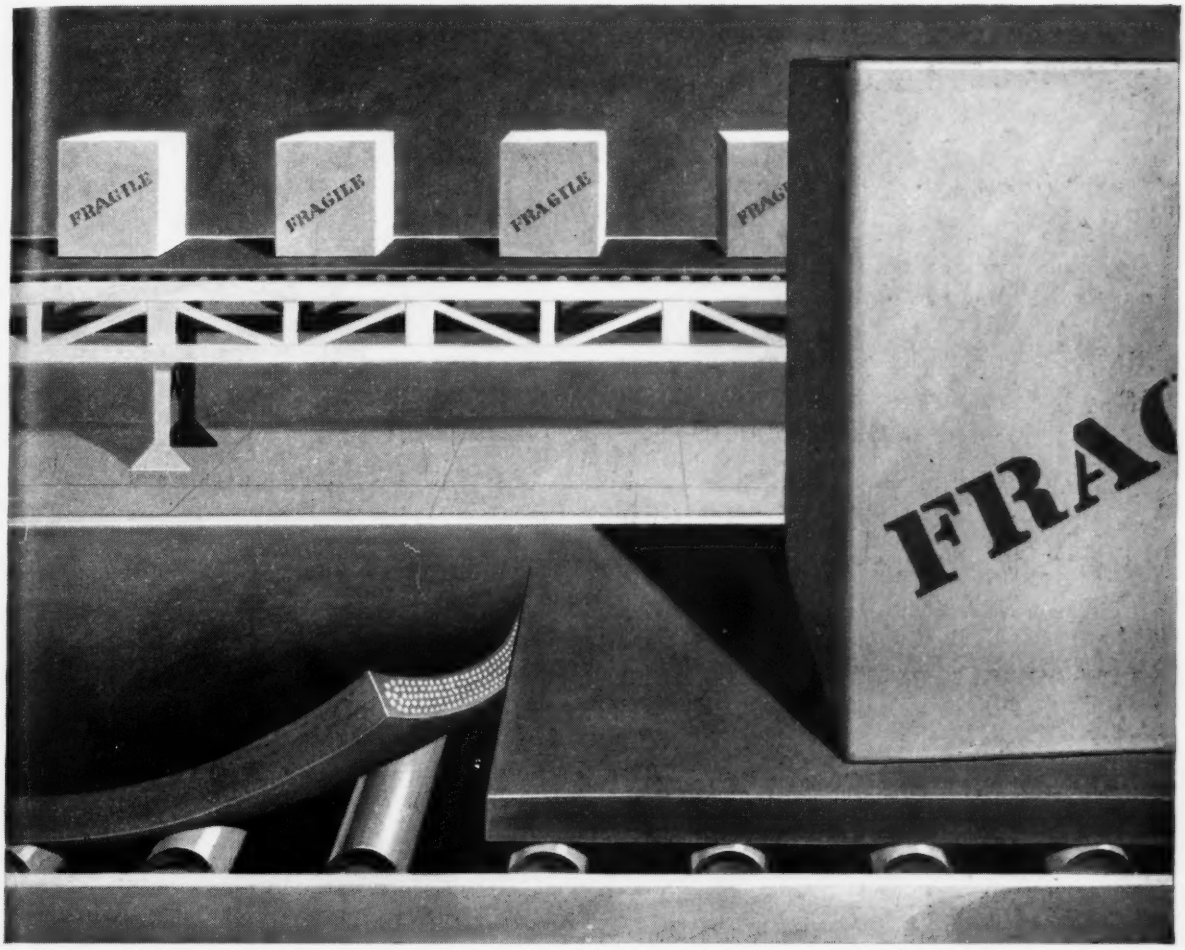
Naugatuck Chemical

Division of United States Rubber Company Dept. A Elm Street Naugatuck, Connecticut

US RUBBER

Rubber Chemicals · Synthetic Rubber · Plastics · Agricultural Chemicals · Reclaimed Rubber · Latices · CANADA: Naugatuck Chemicals Division, Dominion Rubber Co., Ltd., Elmira, Ontario · CABLE: Rubexport, N.Y.

An example of Avisco Rayons in Industry



For stronger, lighter-weight belting, reinforce with Avisco® XL-I rayon fabrics

There are compelling reasons for using Avisco XL-I rayon fibers in your belting fabrics. To begin with, they give you lighter, stronger belts *and for less money* than heavier cotton belting duck—up to 60% greater conditioned tensile ounce-for-ounce.

Avisco XL-I rayon constructions also have excellent flexibility which means good troughing and conformability, 3 to 5 times the fatigue life of cotton. Greater resistance to impact enables belts with rayon to absorb starting and shock loads easily. Lightweight rayon requires less power for starting and running. Send for engineering data on Avisco XL-I rayon fiber.

QUICK REPLY COUPON

Industrial Merchandising Division
American Viscose Corporation
350 Fifth Avenue, New York 1, N.Y.

Please contact me about Avisco XL-I rayon for use in the following application:_____

Name_____

Company_____

Address_____

City_____ Zone____ State_____

AVISCO® RAYON

AMERICAN VISCOSE CORPORATION, 350 Fifth Avenue, New York 1, N.Y.

LET HI-SIL®, SILENE® & CALCENE®
BRIGHTEN YOUR SALES SCENE
WITH COLOR

Every
opport
grabbi
it be r
Colu
ing pig
of hue
gain w

PITT

Every corner of today's bright new home offers profit opportunities for colored rubber goods. Let the eye-grabbing power of color brighten *your* corner . . . whether it be raincoats, racks or rubber footwear.

Columbia-Southern's team of quality *white* reinforcing pigments gives you the key to a door-opening array of hues, tones and shades. Even industrial goods can gain with color, for visual coding or brand identity.

Hi-Sil, Silene and Calcene provide the excellent physicals that your product needs, too. Any level of general properties or specific qualities can be produced by straight or combination loadings of the three pigments.

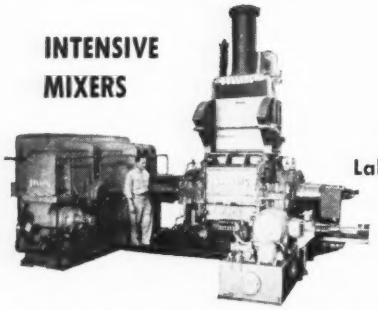
We'd like to be helpful in exploring color's usefulness in your line, or the upgrading of some physical in present goods. Why not write us at Pittsburgh or our district office nearest you?

columbia | southern chemicals
CHEMICAL DIVISION
PITTSBURGH PLATE GLASS COMPANY

ONE GATEWAY CENTER, PITTSBURGH 22, PENNSYLVANIA
DISTRICT OFFICES: Boston • Charlotte • Chicago • Cincinnati
Cleveland • Dallas • Houston • Minneapolis • New Orleans
New York • Philadelphia • Pittsburgh • San Francisco • St. Louis
IN CANADA: Standard Chemical Limited

PRODUCTION and LABORATORY MACHINERY by STEWART BOLLING embodies Advanced Design, Sound Construction, Exclusive Features and Production Potentials which will bring more profit to the producer in Rubber, Plastics and related products.

INTENSIVE MIXERS

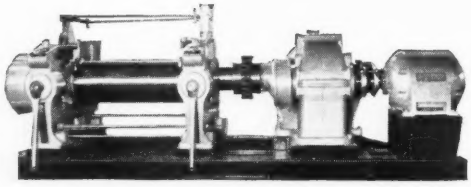


MODELS	CHAMBER CU. IN. CAP.
Laboratory	130 and 275
Lab-Production	1200
Production	3450 through 16000

MILLS

Diameters of rolls • 2½" through 26"

Roll widths • 7" through 100"



Standard or direct drives (direct drive shown).
Eleven standard frame sizes.

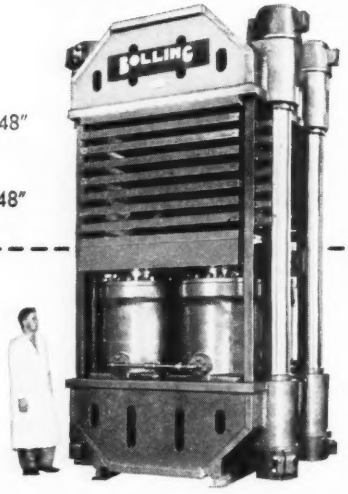
HYDRAULIC PRESSES

Pump Units • Elevators

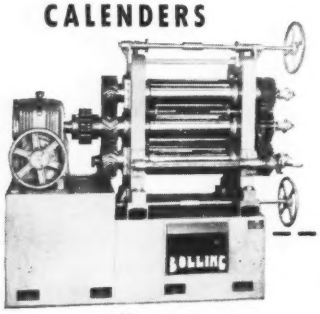
Slabside • 20" x 20" through 48" x 48"

4-rod • 14" x 14" and up

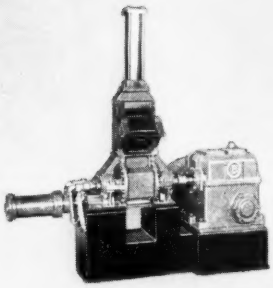
Ring • 22" x 22" through 48" x 48"



CALENDERS



2-roll	8" x 16"
3-roll	through
4-roll	22" x 62"



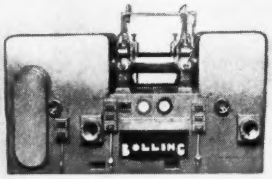
LABORATORY EQUIPMENT

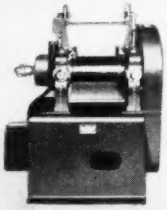
In all lines, Stewart Bolling has laboratory and experimental-production machinery. Mills have received special emphasis, with standard and ULTRA series offered.

TOP—Model O Intensive Mixer with ALL design features of full sized Spiral-Flow mixers.

MIDDLE—8" x 16" ULTRA mill with dual drive, with infinite range of roll speeds and friction ratios.

BOTTOM—10" x 24" experimental-production mill.





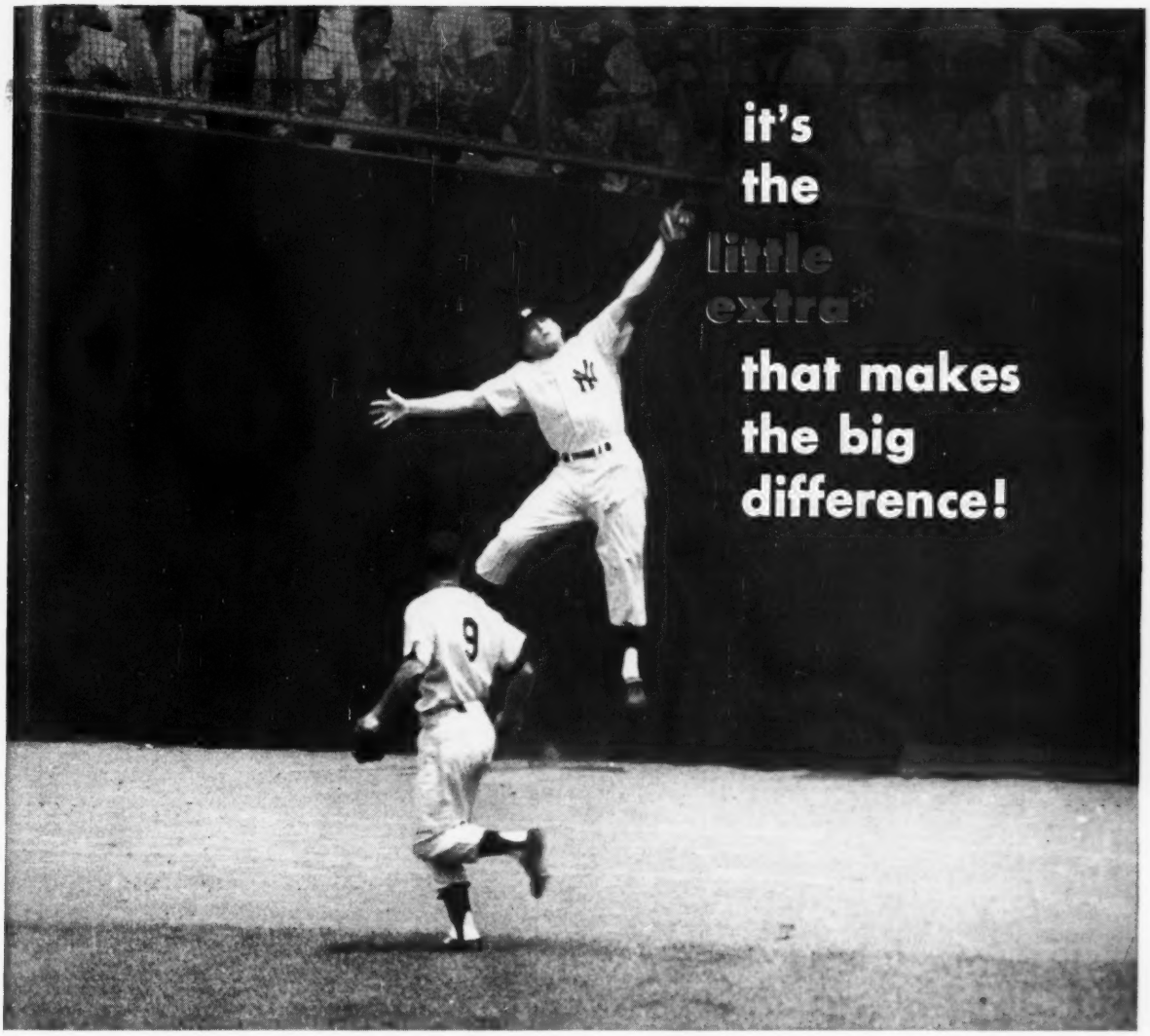
Stewart Bolling

& Company, Inc.

3190 EAST 65th STREET, CLEVELAND 27, OHIO

Designers and Builders of Machinery for the Rubber and Plastics Industries

Intensive Mixers • Calenders • Mills • Refiners • Crackers • Dust Grinders • Sheeters
Hydraulic Presses • Pump Units • Elevators • Bale Splitters • Gears • Reducers • Extruders



* In a World Series contest, the last-ditch leap of a fleet center fielder for the final putout marks a champion. In the rubber industry, it's the same way. Marbon Chemical, pioneer-leader in high styrene rubber reinforcing resins, constantly comes through with the little extra that makes the big difference. Important extras like a consistent, high level of performance through rigid quality control, unsurpassed technical assistance, total reliability, complete research and development facilities, and faster service through same-day shipments. Don't be satisfied with second-best. Sign up with the champion who has led the rubber resin league right from the start—Marbon Chemical!

Get all the facts about Marbon high styrene rubber reinforcing resins for shoe soles, floor tile, wire and cable, hard rubber and mechanical goods. Write Dept. W-9.

MARBON CHEMICAL WASHINGTON — MARBON B-W CHEMICAL — DIVISION **BORG-WARNER** WEST VIRGINA

technical books

BOOK REVIEWS

"Microscopy of Rubber." C. H. Leigh-Dugmore. Published by W. Heffer & Sons, Ltd., Cambridge, England (1961), for the Institution of the Rubber Industry. Cloth, 6¼ by 8¾ inches, 78 pages. Price 25s.

The book deals with the application of microscopy to rubber science and technology. Since the value of microscopy depends upon the experience and ability of the microscopist to interpret what he sees, prepare samples, and efficiently operate the microscope, this monograph is not intended to be a handbook. It is intended, however, to show the microscopist where and how to look for this experience and at the same time to indicate to others the advantages of microscopy. The various microscopes are not described in detail, but the different instruments are discussed, showing their use capabilities and limitations.

There is a chapter on techniques of specimen preparation for the various types of microscopes as well as accessory instrumentation which should be of particular interest to the microscopist. Three chapters, furthermore, deal with the use of the microscope on polymers, compounding, and properties.

The book is technical and concisely written. Rather lucid descriptions and 23 black and white photographs of what is observed are given in many instances which should be helpful even to the uninitiated.

"Annual Report on the Progress of Rubber Technology." Vol. XXIV, 1960. Edited by T. J. Drakely. Published by W. Heffer & Sons, Ltd., Cambridge, England, 1961. Cloth, 7¼ by 9⅞ inches. 190 pages. Price £1-5s.

This annual publication for the Institution of the Rubber Industry, London, England, which focuses attention on technological advances in the rubber industry over the past year, contains data and information collected from international publications arranged in chapter form. There are 24 chapters covering such items as historical and statistical review, chemistry of natural raw and vulcanized rubber, synthetic rubber and production, testing, fibers and fabrics, and all major divisions of rubber goods production.

A complete bibliography of sources as well as a name and subject index is also provided.

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ADHESIVE DATA

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WHY CHEMLOK ADHESIVES LEAD

From a standing start in 1956, Chemlok Adhesives have become the most widely used rubber-to-metal adhesives in the world. There are clear-cut reasons for this quick acceptance of Chemlok 220 and 203.

Only Chemlok Adhesives bond the entire spectrum of commercial elastomers. Only Chemlok Adhesives offer all these performance advantages:

Versatility: One adhesive system bonds natural rubber, GR-S, butyl, neoprene and Buna N to all metals and many rigid plastics.

Wide Manufacturing Tolerances: Bonding is simplified by the wide latitude permissible in compounding, surface preparation, adhesive application, metal parts handling and molding technique.

Environmental Resistance: Maximum resistance to heat, hot and cold water, salt spray, chemicals, oil, solvents and corrosive atmospheres is obtained by use of Chemlok 203 and 220.

One-Coat Application: A single coat of Chemlok 220 outperforms most conventional two-coat systems, and has equivalent environmental resistance.

HOW CHEMLOK ADHESIVES CAN SAVE YOU MONEY

1 coat — less adhesive, less labor, shorter cure time.

1 adhesive — avoids errors, simplifies inventory and application problems.

less scrap — one firm cut scrap losses from poor bond 96%!

easier processing — broad tolerances permit variations in elastomers, techniques, conditions.

NEW DEVELOPMENTS

Among the experimental adhesives now available for evaluation are:

• Adhesive EX-B150-1 permits heat bonding of dissimilar unvulcanized elastomers. It is the first to provide successful rubber-to-rubber bonds between elastomer combinations previously thought impossible to join, particularly where one is based on butyl. Typical applications include conveyor belt covers to bodies, wire and cable jackets to insulation, hose covers, roll covers and multilayer gloves.

• Adhesive EX-B579-1 bonds RTV (room temperature vulcanizing) silicone rubbers to metals, glass, ceramics, plastics and fabrics. One-part, one-coat, nonstaining adhesive provides bonding during the room temperature cure. It meets electronics industry standards, offers excellent environmental resistance to broad temperature conditions.

TECHNICAL LITERATURE

A letterhead request will bring you any of the following:

Technical Bulletin 2012 **"Chemlok Rubber-to-metal Adhesives"** presents comprehensive information on Chemlok 220 and 203.

Technical Bulletin 7101 **"Preparation of Substrates for Bonding"** is a valuable guide to proper surface preparation procedures.

"Some Fundamental Aspects of the Problem of Rubber-to-metal Adhesion" is the title of a technical article reprint which examines theoretical considerations in bonding.

Product bulletins and samples are available on all Chemlok Adhesives—standard, special, experimental. Please define your application area.

SPECIAL-PURPOSE PRODUCTS

Specialty Elastomer Adhesives: Silicone rubber, Viton A, Hypalon and other specialty elastomers are successfully bonded to metals, fabrics and other materials with Chemlok 607.

Surface Treatments: Chemlok Surface Treatments for aluminum are now available. Research is being conducted on Chemical Surface Treatments for metals to enhance their adhesion to organic materials.

Experimental Adhesives: Unique products are now being sampled or are under development which will create design opportunities now impractical because of inadequacy of existing adhesive products.

If you would like information regarding our progress in any of these fields, please write us.

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technical books

NEW PUBLICATIONS

"Hallcomids." The C. P. Hall Co. of Illinois, Chicago, Ill. 28 pages. This report describes a new unique series of N,N-dimethyl amides, and discusses their properties, suggested uses, and physical properties.

"Linde Chemical-Loaded Molecular Sieves." Bulletin F-1514. Linde Co., Molecular Sieve Products, Tonawanda, N. Y. 2 pages. This gives a list of current experimental and commercial chemical-loaded molecular sieve products.

"Aryl Mercaptans." Pitt-Consol Chemical Co., Newark 5, N. J. 15 pages. This comprehensive technical brochure covers the chemistry, suggested applications, physical properties data, literature references, etc. of these products.

"CDS-191." Silicone Products Department, General Electric, Waterford, N. Y. 8 pages. This is a revised guide for use of room-temperature vulcanizing liquid silicone rubber for model reproduction.

"Wheelabrator Rubber Deflashing." Wheelabrator Corp., Mishawaka, Ind. Bulletin #178-D. 12 pages. This bulletin contains a description of the deflashing sequence and principle of operation. Typical examples of savings are included, such as seals deflashed in four minutes instead of hand trimmed in 3½ hours and $13.00/thousand saved on an automotive transmission gasket. (For a more complete story see RUBBER WORLD, May, 1961, pages 67-70.)

"Fuller Equipment." Bulletin G-3E. Fuller Co., Catasauqua, Pa. 12 pages. Described are pumps, blowers, conveyors, etc., for industry.

"It's a Fact." B. I. F. Industries, Providence 1, R. I. 37 pages. This collection of bulletins contains data sheets, illustrations, schematic diagrams, and descriptions of operations for feeding systems.

"Aliphatic Organic Chemicals." Armour Industrial Chemical Co., Chicago 90, Ill. 12 pages. Listing of some 150 products along with specifications and typical applications is given.

"Bauer No. 7-AB Crusher-Shredder." Bulletin G-6. The Bauer Bros. Co., Springfield, O. 2 pages. Photodiagram of design and construction features are included in this bulletin.

"Gasket Materials." Bulletin AD-190. Garlock, Inc., Palmyra, N. Y. 24 pages. Also Bulletin AD-176. These bulletins contain technical data and introduce newer materials including ceramic filled gaskets.

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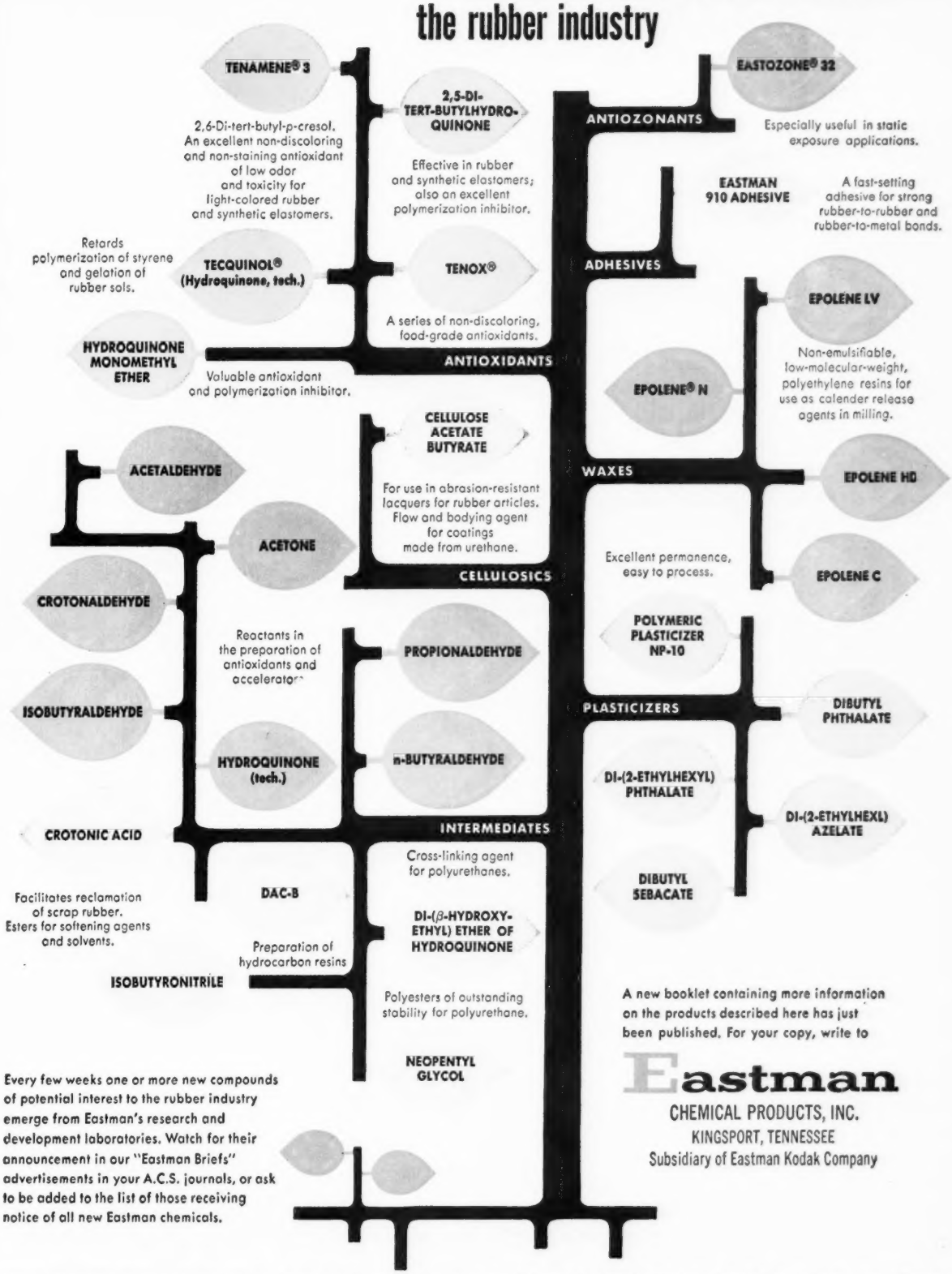
A family of fine products to serve the rubber industry



Every few weeks one or more new compounds of potential interest to the rubber industry emerge from Eastman's research and development laboratories. Watch for their announcement in our "Eastman Briefs" advertisements in your A.C.S. journals, or ask to be added to the list of those receiving notice of all new Eastman chemicals.

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technical books

Publications of Shell Chemical Co., Torrance, Calif., covering formulations using "Shell Isoprene Rubber Type 305":

"Grade R 420 Black Compound." Bulletin SC:61-108. One page.

"Grade R 610 Non-black Compound." Bulletin SC:61-109. One page.

"Grade R 620 Black Compound." Bulletin SC:61-110. One page.

"Grade R 715 Non-black Compound." Bulletin SC:61-611. One page.

"Grade R 720 Black Compound." Bulletin SC:61-112. One page.

"Grade R 820 Black Compound." Bulletin SC:61-113. One page.

"Philprene 1808 Compound for SC-615-BE Specification." Bulletin No. 36. Phillips Chemical Co., Akron 8, O. 2 pages.

Polymeric Plasticizers

(Continued from page 52)

good, general-purpose, medium molecular weight polymeric with excellent soapy-water extraction and outdoor stability.

Plastolein 9765 (formerly Emery 3314-D) is a medium molecular weight polymeric offering the best all-around performance, outstanding humidity aging, and best extraction resistance. A special deodorized grade is available.

The above will complement Plastolein 9720 which will continue to be the choice in uses demanding its ease of processing and low viscosity.

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Lipco Paste, a multi-purpose rubber extender, went into production at Long Island Plastic Corp., Lindenhurst, N. Y. It is a patented, low-cost nylon and accelerator (added) material miscible with synthetic and natural rubber.

The successful injection molding of the nylon-rubber compound was accomplished in conjunction with the Watson-Stillman division of Farrel-Birmingham Co., Rochester, N. Y.

Molding cycle time has been reduced by 70-80%. Blemish-free pieces as thin as 0.030-inch gage have been molded in a 30-second to 2½-minute cycle as compared with a 2½- to four-minute cycle without the additive. Virtually unlimited shelf life of compounded material is indicated.

The company reports that exhaustive tests on molded goods such as shoe lifts, heels, typewriter rollers and sheeting demonstrated approximately 20-25% more tensile strength, hardness and elongation.

A VIEW OF THE FUTURE

1970
1980
1990
2000
2010

If you could look ahead into the years yet to come, the source of Champion and Natka 1200 hard clays probably wouldn't look much different from today. These vast reserves of millions of tons of high grade material are the guarantee that compounders of the future (your grandchildren perhaps) will be relying on the same quality and uniformity that you have come to expect from NATIONAL KAOLIN PRODUCTS COMPANY.

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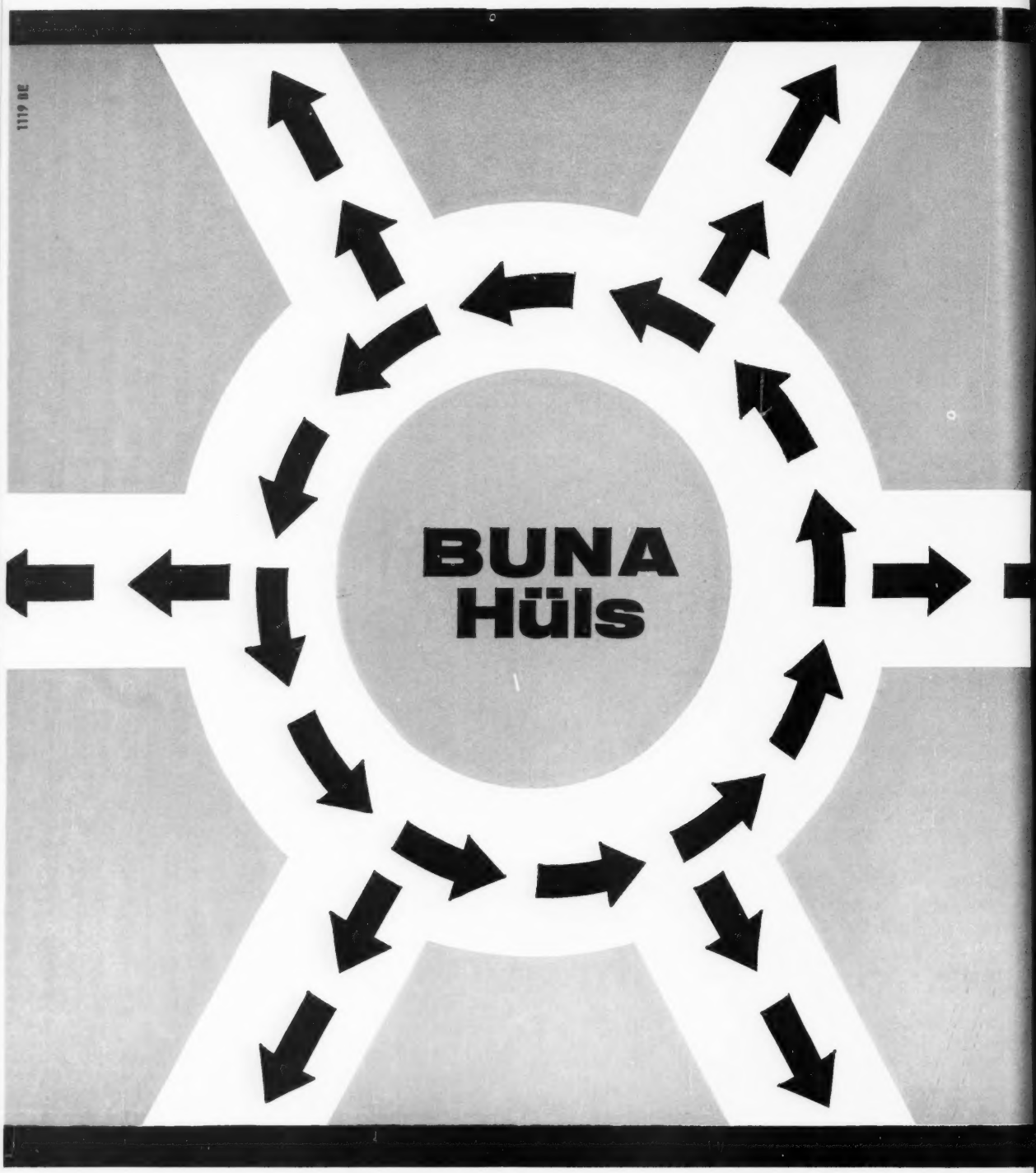

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Seven standard grades, eight special grades and two types of latex – these comprise the BUNA Hüls range. The right material for every application. Every grade is correctly formulated and quality never varies.

Round-the-clock production at Bunawerke Hüls, coupled with adequate stocks ensure prompt delivery. This reduces storage costs for the processer.

STANDARD GRADES

BUNA Hüls 150
HS, staining
General purpose type, specially suited for manufacture of tyres, conveyor belting, high quality shoe soles, technical mouldings and special items.

BUNA Hüls 152
HS, non-staining
General purpose type for the manufacture of light coloured rubber goods and high quality shoe soles.

BUNA Hüls 153
HS/FS, non-staining
Specially developed for the production of very light coloured and transparent rubber goods and cable insulation.

BUNA Hüls 302
HS, staining, with 37.5 parts oil
Recommended for tyres, retreading, technical mouldings.

BUNA Hüls 362
HS/FS, non-staining, with 37.5 parts oil
Light coloured and transparent grade with good processing characteristics on roll mill and calender; reduced tackiness during processing.

BUNA Hüls 372
HS, non-staining, with 37.5 parts oil
Excellent properties, specially suited for production of light coloured and transparent articles, white walled tyres.

BUNA Hüls 373
HS, non-staining, with 50 parts oil
For the economical production of moulded rubber goods of all types; raw material cost reduced.

SPECIAL GRADES

BUNA Hüls BT 13
HS/FS, equivalent to BUNA Hüls 373

BUNA Hüls BT 21
HS/FS, equivalent to BUNA Hüls 302
The advantage of these two grades is that there is reduced tackiness when processing raw mixes on roll mills.

Types with high Mooney values

BUNA Hüls BT 4
HS, staining; Mooney viscosity (ML_4) approx. 120

BUNA Hüls BT 22
HS/FS, equivalent to BT 4

BUNA Hüls BT 12
HS, non-staining, Mooney viscosity (ML_4) approx. 150

BUNA Hüls BT 15
HS, non-staining, Mooney viscosity (ML_4) approx. 130
These grades are especially suitable for the production of heat resistant articles, e. g. high pressure gasketing, brake and clutch linings as well as for flame resistant rubber mixes with high chlorparaffin content; extremely low compression set in the case of grade BT 12; processability of BT 15 better than that of BT 12.

Types with low Mooney values

BUNA Hüls BT 16
HS/FS, non-staining, Mooney viscosity (ML_4) approx. 40

BUNA Hüls BT 17
HS/FS, non-staining, Mooney viscosity (ML_4) approx. 30
These grades are distinguished by the ease with which they take up fillers, better calendering properties and less shrinkage. Designed for the production of soft, easy flow rubber mixes (e. g. for rubber soles made by moulding direct to uppers); also for sponge rubber.

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BUNA Hüls 200
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BUNA Hüls 220
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HS: rosin acid, FS: fatty acid

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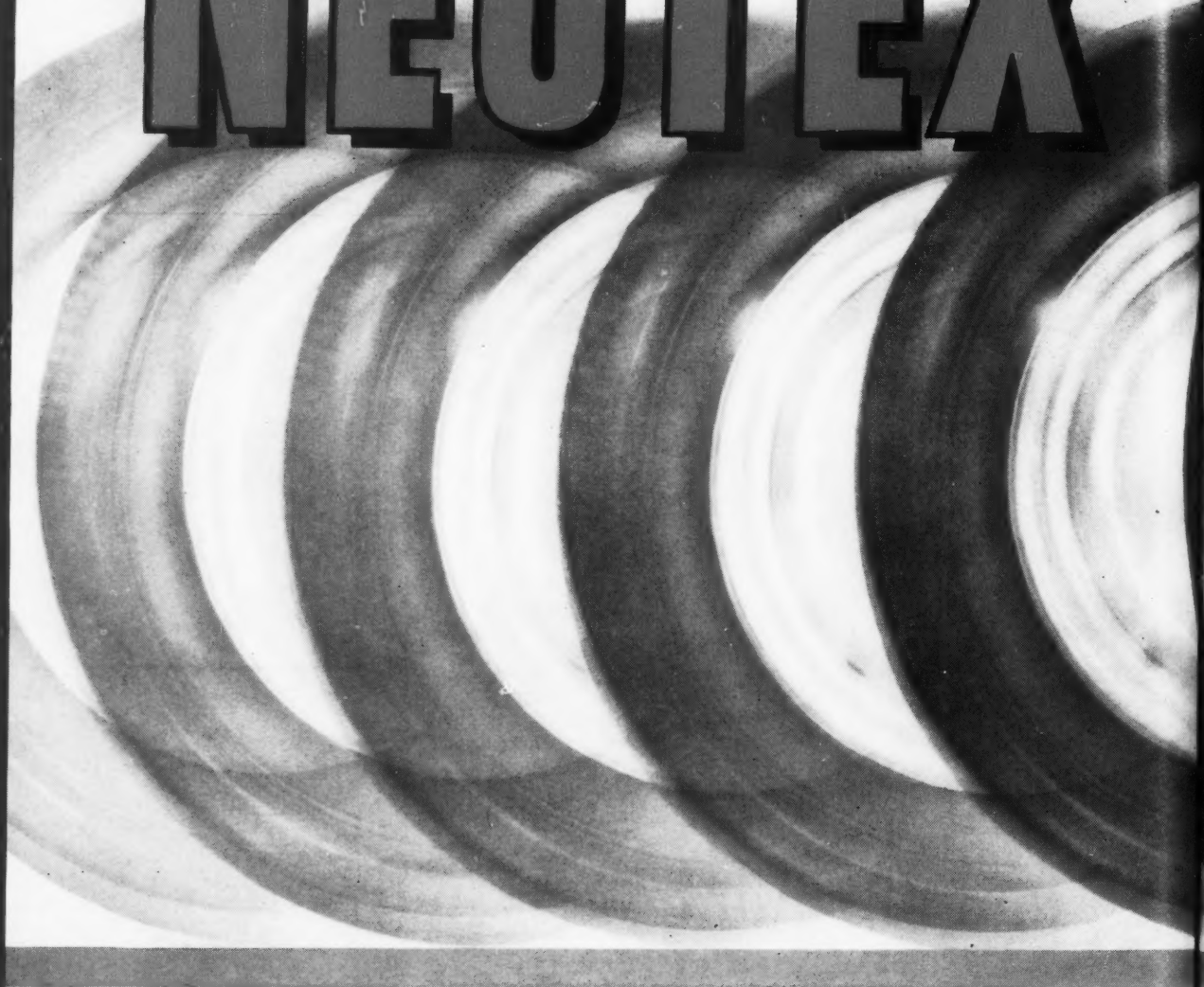

Industry asked for a softer ride

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...in the HAF fineness range...develops low modulus...for use in carcass stocks, natural rubber treads, high grade mechanicals, etc.

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...in the ISAF fineness range...develops low modulus, good tensiles, high elongation and lower Shore Hardness...for improved ride in passenger tires.

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...in the SAF fineness range...produces highest tensiles of any rubber carbon...gives best ride-noise-tread wear combination ...tailor-made for the Black Rubber process.

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CALENDAR of COMING EVENTS

September 29
Fort Wayne Rubber & Plastics Group.
Southern Ohio Rubber Group.
Chicago Rubber Group. Furniture Club, Chicago, Ill.

October 3
The Los Angeles Rubber Group, Inc.

October 5
Detroit Rubber & Plastics Group, Inc.

October 10
Buffalo Rubber Group. Hotel Westbrook, Buffalo, N. Y.

October 12
Northern California Rubber Group.

October 13
Boston Rubber Group. Hotel Somerset, Boston, Mass.

October 17
Elastomer & Plastics Group, Northeastern Section, ACS.

October 20
New York, Philadelphia, and Connecticut Rubber Groups. Joint Meeting. Henry Hudson Hotel, New York, N. Y.
Akron Rubber Group. Sheraton-Mayflower Hotel, Akron, O.
American Institute of Electrical Engineers. General Meeting Including Symposium on Butyl Wire and Cable Insulations. Detroit, Mich.

October 26-27
Third Annual Symposium on High-Speed Testing. Hotel Somerset, Boston, Mass.

November 2
Rhode Island Rubber Club.

November 3
Philadelphia Rubber Group. Dance. Manufacturers Country Club.

November 7
The Los Angeles Rubber Group, Inc.

November 9
Northern California Rubber Group.

November 17
Connecticut Rubber Group.
Chicago Rubber Group. Furniture Club, Chicago, Ill.

November 17-18
Southern Rubber Group. Memphis, Tenn.

November 29-December 1
Tenth Annual Wire and Cable Symposium. Berkeley-Carteret Hotel, Asbury Park, N. J.

December 7
Fort Wayne Rubber & Plastics Group.

December 8
Detroit Rubber & Plastics Group, Inc.

December 8
The Los Angeles Rubber Group, Inc. Christmas Party.

December 9
Southern Ohio Rubber Group.

December 12
Buffalo Rubber Group. Christmas Party. Buffalo Trap & Field Club.

December 15
New York Rubber Group. Christmas Party. Henry Hudson Hotel, New York, N. Y.
Boston Rubber Group. Christmas Party. Hotel Somerset, Boston, Mass.
Chicago Rubber Group. Christmas Party. Morrison Hotel, Chicago, Ill.

1962
January 26
Akron Rubber Group.
Chicago Rubber Group. Furniture Club, Chicago, Ill.

January 26-27
Southern Rubber Group.

February 5-9
American Society for Testing Materials. Committee Week. Statler Hilton Hotel, Dallas, Tex.

February 6
The Los Angeles Rubber Group, Inc.

February 8
Fort Wayne Rubber & Plastics Group.

March 6
The Los Angeles Rubber Group, Inc.

March 16
Chicago Rubber Group. Furniture Club, Chicago, Ill.

March 20-29
American Chemical Society. Washington, D. C.

March 23
New York Rubber Group. Henry Hudson Hotel, New York, N. Y.

March 24-27
National Association of Secondary Material Industries. Forty-Ninth Annual Convention. Edgewater Beach Hotel, Chicago, Ill.

April 3
The Los Angeles Rubber Group, Inc.

April 5
Fort Wayne Rubber & Plastics Group.

April 6
Akron Rubber Group.

April 24-27
Division of Rubber Chemistry, ACS. Statler Hotel, Boston, Mass.

May 4
Chicago Rubber Group. Furniture Club, Chicago, Ill.

HUBER

Lack Tack?

BUTAC | NATAC | TURGUM S

Butac® improves pigment dispersions, tensile strength, resistance to tear, heat embrittlement and cut growth in SBR rubbers; improves knitting of laminated Nitrile compounds. Activates cure slightly; use 2 to 10 parts per 100 parts SBR.

Natac® inhibits bloom in natural rubber and natural rubber/SBR blends; maintains tack in calendered uncured stocks, even where abnormal temperature changes promote bloom. Neutral with thiazole and thiuram acceleration; use 3 to 4 parts per 100 parts rubber hydrocarbon.

Turgum® S plasticizes and conditions SBR; retards polymerization of polymer at mixing temperatures, and improves cured physical properties. Turgum S is a very effective retarder for high, intermediate and super abrasion furnace black/natural rubber stocks over the entire processing temperature range from 220° to 270°F. Use 5 to 15 parts per 100 parts SBR; 3 to 4 parts per 100 parts natural rubber.

	Density (Sp. Gr.)	*Softening Point (Ring & Ball)*
Butac	1.075—1.085	135—152°F.
Natac	1.075—1.085	145—155°F.
Turgum S	1.06—1.07	135—145°F.

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Do Your Plans to Meet Emergencies Include the Problem of Fallout?

We are basically optimistic and do not expect world leaders to plunge us into a catastrophic nuclear war. Tensions and tempers being what they are, however, an irresponsible act in one of many parts of the globe might be the catalytic spark which would cause a limited or large-scale conflict. Perhaps this would make an evaluation of how coming events might create problems for each of the plants in our essential industry a wise precautionary measure.

Since the government has decided that it is necessary to mobilize at least some reserve and National Guard units, some of these men are bound to work in rubber factories. Covering their positions could be quite a problem for a plant with a number of employes in a local unit. A training plant to provide substitutes would seem in order for such a plant.

Much publicity has been given to plans and the need of fallout shelters in the home. Little has been said, however, about industrial plans. In cities the plan seems to be to concentrate on designating basements or central locations in substantial buildings as shelter areas. Many modern factory buildings with one-story construction and large windows may not include an adequate shelter area. If such shelter is available or provided, the problems confronting the manager of a factory caught in a fallout zone in providing food, water, and communication as well as maintaining discipline and morale for a period of days or weeks would be enormous. Preliminary plans, check lists, and advisory instructions to supervisors could be prepared so that they would be readily available if needed. A sneak attack would allow little time for planning after the alarm is sounded.

We do not wish to contribute to any war-scare hysteria and are very hopeful that any plans drawn up could eventually be consigned to the waste basket without ever having been used. It would seem to us that prudent management would include plans for this type of situation as well as fire, flood, accident, or other emergency.

R. S. Walker

EDITOR

A Simpler, Effective System For Rubber-to-Metal Bonding

Use of Chemlok adhesives permits bonding of NR, SBR, CR, NBR, and IIR to a variety of metals with one coat of same adhesive. Companion primer enhances environmental resistance and metal adhesion in two-coat system or provides one-coat NBR bonding

By J. W. GALLAGHER

Hughson Chemical Co., Erie, Pa.

THE introduction of Chemlok adhesives for rubber-to-metal bonding in the Spring of 1956 initiated a new era in the production of bonded assemblies. Chemlok 220 offered, for the first time, the ability to bond such diverse elastomers as NR (natural rubber), SBR, CR (neoprene), NBR (nitrile), and IIR (butyl) to a variety of metals with a single coat of the same adhesive. Chemlok 201, a companion primer since replaced by Chemlok 203, offered greatly improved environmental resistance, enhanced metal adhesion, and one-coat NBR bonding.

The greatest virtues of the new adhesive system, however, did not become apparent until it had been used in production for a considerable length of time. The amazing utility of Chemlok adhesives under processing conditions often ranging from excellent to poor, the ability to bond elastomer stocks compounded with progressively less regard for bonding ability, and the uniformity of results month after month confirmed the belief that a valuable production aid had become available to manufacturers of rubber-to-metal products.

State of the Art, 1956

In order to appreciate fully the contributions made to the technology of rubber-to-metal bonding by the new Chemlok adhesives, let us review the state of the art in 1956.

The venerable brass-plate process, for many years the mainstay of the industry, had already been largely replaced by adhesive bonding. One authority reported that early in 1957 only 20% of rubber-to-metal bonded assemblies produced in the molded goods industry were made by the brass-plate process (1).[1] There were four principal reasons for the decline of brass-plate bonding:

1. Lack of tolerance in both elastomer compounding and brass composition.

S. Buchan recently stated this very well: "Only certain brass compositions can be employed, and to these particular brasses only specific rubber qualities may be vulcanized if a consistently high level of adhesion is to be maintained" (2).

These limitations were entirely incompatible with the wide range of properties required of elastomers used in exacting military and industrial applications.

2. Plating difficulties. This delicate process required that the composition of the plating solution be rigidly controlled, and that the pH and temperature be held within narrow limits. Amperage, voltage, current density, and the time of plating also required close attention, since small variations resulted in a deposit which caused bonding difficulties.

3. Metal handling problems. Plated metal parts were extremely sensitive to extended layover times and adverse storage conditions. Safe operating procedures required that metal parts be further processed within a few hours after plating.

4. Bond failure in service. While the resistance of the brass-plate bond to aging, to oils and solvents, and to most chemical environments was exceptionally good, certain electrolytic conditions caused rapid galvanic decay of the bond.

The principal strongholds of brass-plate bonding at

[1]Numbers in parentheses refer to Bibliography items at end of this article.

TABLE 1. VARIOUS ELASTOMER COMPOUNDS BONDED TO COLD ROLLED STEEL WITH ONE COAT OF CHEMLOK 220 TESTED AT ROOM TEMPERATURE AND AT ELEVATED TEMPERATURE*

Elastomer	Test Temperature Compound†	RT Lbs./In.	RT % Rubber	250° F. Lbs./In.	250° F. % Rubber
NR	HC 100	89	100	99	100
NR	HC 101	67	100	40	100
NR/SBR	HC 150	141	100	65	100
SBR	HC 204	101	100	52	100
SBR	HC 250	88	100	50	100
CR (GNA)	HC 301	81	100	35	100
CR (WRT)	HC 353	88	100	29	100
IIR	HC 503	61	100	37	100
IIR	HC 504	62	100	39	100
NBR	HC 610	161	100	61	100
NBR	HC 611	105	100	31	100

* Tested according to ASTM D 429-58, Method B. Adhesives applied by dipping. Bonded samples are stressed to failure on a Scott tester (Scott Testers, Inc., Providence, R. I.). Results are reported as pounds pull per linear inch, and % rubber remaining on bonded area of the metal after failure. This test method is used for all tables unless otherwise specified.

† Hughson Chemical Co. compounds. Formulas available on request.

that time, as they are today, were plants with long experience in the process, with plating equipment still operating efficiently, and with elastomer compounds compatible with both the brass composition and the service requirements of the bonded unit.

Ebonite Process Limited

The ebonite bonding process, utilizing a layer of ebonite or "hard rubber" between the metal and the softer rubber, was used only in certain less demanding applications because of three serious disadvantages:

1. The rigidity and brittleness of the ebonite layer severely limited the function of bonded assemblies.
2. The thermoplastic nature of the ebonite caused bond failure at the relatively low temperature of 200° F.
3. The high sulfur content of at least 32% in the ebonite caused undesirable chemical reactions at the soft rubber interface.

In 1957, bonding with organic adhesives accounted for an estimated 80% of the production of bonded assemblies in the molded goods industry (1). Non-molded items, such as tank linings and large rubber-covered rolls, utilized adhesives to an even greater extent. The vast majority of rubber-to-metal bonders in the wire and cable industry used organic adhesives, but some large producers found brass-plate bonding preferable. This preference was predicated largely on the continuous processing methods commonly used in the industry and on the utilization of elastomer compounds and brass compositions proved to be compatible with the process.

Organic adhesives in widespread use at that time were proprietary formulations marketed by four domestic producers and two European firms. Most of the adhesives produced in the United States were well known and widely used in overseas markets, but the adhesives produced in Europe never attained large-scale usage in this country.

The leading producers of adhesives offered a wide variety of formulations, each designed for bonding a limited number of elastomers. Other producers offered fewer products, but their utility was limited to a narrow range of elastomer-to-metal combinations. The many advantages of these proprietary adhesives were responsible for their domination of the industry, but many problems were involved in the selection and use of the proper adhesive for a specific application. This situation was very well described by J. H. Gerstenmaier in a 1953 article (3):

"The rubber technologist, faced with the question, 'Can this (specific) rubber be bonded to this (specific) metal?', begins his work realizing that a satisfactory bond can likely be obtained, but he is faced with a seemingly endless array of possible combinations of manufacturing methods and adhesive materials which must be considered to assure results which will most adequately satisfy the finished product specification and use. Each type of natural or synthetic rubber may demand a different manufacturing procedure or bonding material, and each different metal will require individual consideration. No universal method or no all-purpose cement has been developed; therefore, each combination of materials presents its own problems and resultant bonding procedures."

Procedures Specified

Successful processing methods for bonding all of the five commonly used elastomers to many metals were known and recommended by the adhesive suppliers. If these procedures for metal preparation, adhesive selection, elastomer compounding, and factory processing were followed within the narrow limits designated as acceptable, good results usually followed.

1. Metal surface preparation. The only metal-surface preparation method recommended by all authorities without qualification was grit blasting or blasting with sand or other abrasive materials. Chemical methods were recommended for some applications, usually without enthusiasm.
2. Adhesive selection. The large-volume elastomers used in rubber-to-metal bonded assemblies were NR and SBR. Two-coat adhesive systems, consisting of a primer and an adhesive or cover coat, were usually recommended for bonding these elastomers. An estimated 60% of all bonded units produced in 1957 were made with two-coat systems (1), a figure which reflected the relatively large usage of NR and SBR.

One-coat adhesives were commonly used for CR and NBR with generally excellent results except for some problems involving corrosion between CR and steel. Successful IIR bonding required two coats, but many IIR compounds resisted all efforts to form an adequate bond.

Silicone rubbers and other specialty elastomers were used in small volume, but their ability to meet unusual service requirements indicated a more important place for these materials in the future. Special adhesives were required for most of these elastomers.

3. Elastomer compounding. Certain general principles for compounding elastomers for good adhesion were well known, and certain others were closely guarded secrets of a few manufacturers. Many compounding ingredients were known to have adverse effects on bonding, and their use was avoided. Soft stocks were notorious for poor bonding, and considerable effort was spent to improve this situation by skillful compounding.

4. Factory processing. The success or failure of the entire bonding operation frequently depended on the ability of production personnel to control processing within the narrow limits known to produce good bonds. Metal parts handling, adhesive application, layover of coated metal parts, ambient temperature and humidity, cure time and temperature, cavity pressure and mold design all required close attention for trouble free operation.

Chemlok Adhesives Developed

The evident need of improvements in all of the principal divisions of the bonding process had resulted in the initiation of research programs in the laboratories of both bonding firms and adhesive suppliers. At Lord Mfg. Co. in Erie, Pa., such a program had been in progress for several years. Lord, a leading producer of bonded assemblies used in such demanding applications as aircraft engine mountings and instrument shock mountings, was vitally concerned with adhesion.

Early in the program it became evident that no really significant improvements in the bonding process were forthcoming from studies of processing and compounding. Only marginal changes in one processing area, using a given adhesive system, could be tolerated without compensatory tightening of controls in other areas. What was really needed was an escape from the ironclad operating rules that made rubber-to-metal bonding an art rather than a science.

New adhesive formulations had appeared on the market from time to time which, based on impressive laboratory data, appeared to have great promise. They did not pass the real test, however, that of showing appreciable advantages in long-term usage in large numbers of different production operations. Some showed marginal improvements over their predecessors, and they remained on the list of available products, but others were soon withdrawn from the market.

In November of 1955 an important contribution to the theory of rubber-to-metal bonding was published by D. M. Alstadt. This widely read article, "Some Fundamental Aspects of Rubber-Metal Adhesion" (4), summarized some of the findings of the Lord research program and explained some of the author's theoretical conclusions concerning the nature of the rubber-metal bond. These basic theories had already led to the development of a new adhesive system then being thoroughly checked in the Lord test facilities.

In concluding his article, Alstadt stated, "Perhaps the most promising avenue for future adhesive development is the synthesis of completely different and unique polymers and crossbridging agents especially designed for rubber-metal adhesion use" (5).

Chemlok 220 and 201 were offered to the industry within a few months, and Chemlok 607 for bonding specialty elastomers followed shortly thereafter. Lord Mfg. Co. formed a special products division to pro-

TABLE 2. THE BONDING OF AN NR COMPOUND (HC 100) TO A VARIETY OF METALLIC AND NON-METALLIC SUBSTRATES USING CHEMLOK 220 ALONE AND A CHEMLOK 203/220 TWO-COAT SYSTEM

		Chemlok 220		Chemlok 203 and 220	
Substrate	Surface Treatment	Lbs./in.	% Rubber	Lbs./in.	% Rubber
Steel (cold rolled-no scale or rust)	Degreased*	68	100	74	100
	Alkaline cleaned	76	100	79	100
	Grit blasted†	84	100	81	100
Steel—chrome plated	Degreased	76	100	73	100
Cadmium plated	Degreased	78	‡100	67	‡40
Stainless steel	Degreased	85	80	79	100
	Grit blasted	85	100	91	100
Aluminum	Degreased	32	20	80	100
	Sand blasted	78	100	76	100
	Chemlok 720 treated	74	100	89	100
Aluminum—anodized	Degreased	89	100	88	100
Magnesium	Degreased	77	95	81	90
	Dichromate treated§	78	100	75	100
Brass	Degreased	20	5	74	100
	Chemically treated‖	75	98	76	100
	Sand blasted	80	100	75	100
Brass—leaded	Degreased	43	25	76	100
	Chemically treated‖	74	95	79	100
	Sand blasted	94	100	92	100
Brass—silver plated	Degreased	19	5	75	100
Copper	Degreased	20	10	76	100
	Chemically treated‖	20	10	77	100
	Sand blasted	30	20	92	100
Lead	Degreased	79	100	76	100
Galvanized iron	Degreased	50	40	86	85
	Fine sand blasted	46	25	88	100
Titanium	Degreased	85	100	80	100
Formica	Solvent wiped	57	¶	59	¶
Fiberglas	Solvent wiped	56	¶	49	¶
Wood (oak)	Freshly cut	67	¶	56	¶

* In this table "degreased" means that the parts were processed in a vapor degreasing unit using trichloroethylene.

† In this table "blasted" means that the parts were degreased, blasted with the specified abrasive, and again degreased.

‡ Results with cadmium-plated steel are frequently erratic. Plating conditions and the nature of the deposited surface affect adhesive wetting and bond strength.

§ Dow Treatment #1 in Dow Chemical Corp. booklet, "Magnesium Finishing."

‖ Ammonium persulfate treatment.

¶ Failure in non-elastomeric component.

TABLE 3. EFFECT OF METAL SURFACE TREATMENT ON BONDING AN NR COMPOUND (HC 101) TO MAGNESIUM

Adhesive System	Treatment	Lbs./in.	% Rubber
Chemlok 220	Degrease	48	50
220	Grit blast	57	90
220	Chrome pickle	66	100
203/220	Degrease	68	100
203/220	Grit blast	56	100
203/220	Chrome pickle	60	100

TABLE 4 EFFECT OF METAL SURFACE TREATMENT ON THE BOND BETWEEN AN NR COMPOUND (HC 101) AND MAGNESIUM AFTER AGING IN BOILING WATER FOR TWO HOURS

Adhesive System	Treatment	% Rubber
Chemlok 203/220	Degrease	65
203/220	Grit blast	80
203/220	Chrome pickle	100

duce, market, and service the new products. The name of this division of the company was changed to Hughson Chemical Co. in 1959.

Performance of Chemloks

In appraising the performance of Chemlok 220 and 203, it is necessary to consider as a unit the entire bonding process, including performance of the finished parts in field service. Only in this way can the adhesive system's unprecedented versatility, immensely improved latitude in processing, and freedom from traditional restrictions be appreciated. In presenting data, however, we must treat the various elements of the process individually, remembering the interrelation between each element and the total process.

Bonding to Various Elastomers

The outstanding property of Chemlok 220, the one which at once sets it apart from all other bonding agents ever to appear on the market, is its versatility in bonding diverse elastomer compounds. The versatility of a single coat of this adhesive is twofold: it bonds compounds of the five commonly used elastomers, NR, SBR, CR, IIR, and NBR, as well as some less commonly used elastomers; and it bonds a wide range of compounds of each elastomer type.

Table 1 shows test results obtained with a number of elastomer compounds bonded to cold rolled steel with one coat of Chemlok 220. The steel was prepared by degreasing in trichloroethylene, blasting with steel grit, and again degreasing in trichloroethylene.

Uses of Chemlok 203

Before discussing the versatility of Chemlok 220 in bonding to various substrates and in other situations, let us consider the uses of Chemlok 203 so that meaningful data may be presented for both adhesives in the same tables.

Chemlok 203 is used as a primer under Chemlok 220 for three principal reasons:

1. Improved environmental resistance. While the environmental resistance of the bond formed with Chemlok 220 alone is equal to that of most two-coat systems, additional resistance to destructive environments is obtained with Chemlok 203.
2. Minimum surface preparation. Because of the form or composition of some metal parts, or because of necessary or desirable processing limitations, metal surface preparation is frequently minimized. The use of Chemlok 203 as a primer with Chemlok 220 allows the use of some methods which might be inadequate with Chemlok 220 alone, or with any other adhesive system.
3. Greater bonding latitude. Chemlok 203 adds to the bonding latitude of Chemlok 220 by protecting the metal surface against migrating compounding ingredients and undesirable reaction products from the elastomer.

Chemlok 203 is also used as an environmentally resistant one-coat adhesive for NBR compounds. The two-coat system of Chemlok 203 and 220 also has excellent resistance, but the use of Chemlok 220 alone as an NBR adhesive is recommended with qualifications because this elastomer is often compounded for applications requiring maximum environmental resistance.

At this time a question may arise as to the use of Chemlok 220 alone, or use of the two-coat system. Many factors can influence this decision; therefore let us defer consideration of the problem until we have reviewed all the performance data.

Bonding to Various Substrates

Now let us study the data compiled on the bonding of an NR compound to a variety of metallic and nonmetallic substrates with Chemlok 220 alone, and with Chemlok 203 and 220 as a two-coat system. Table 2 shows two facets of the performance of the adhesives:

1. The ability of either Chemlok 220 alone or Chemlok 203 and 220 to bond to a varied range of substrates.
2. The ability of Chemlok 203 and 220, and frequently of Chemlok 220 alone, to form good bonds to metals prepared with minimum surface treatment methods.

Effect of Metal Treatment

Table 2 shows the results obtained by bonding to metals prepared with different surface treatment methods, both with Chemlok 220 alone and with Chemlok 203 and 220. Based on the evidence in this table, on other data obtained in the laboratory, and on field reports, three general statements can be made concerning surface preparation:

1. Chemlok 203 and Chemlok 220 together tolerate surface preparation methods of a lower degree of effec-

tiveness than those required to obtain equally good bonds with Chemlok 220 alone or with any other adhesive system.

2. Chemical methods, such as phosphatizing for steel, and the persulfate treatment for brass and copper, are entirely satisfactory for most elastomer-metal combinations.

3. Chemlok adhesives offer the rubber-to-metal bonder a much wider latitude in the selection of metal surface preparation methods than any other adhesive system ever developed.

Sometimes the effect of differences in metal surface preparation cannot be observed because of variables in other parts of the bonding process. In one industrial application excellent bonds were obtained with Chemlok 220 in bonding natural rubber to stainless steel prepared by solvent cleaning. When the parts were accidentally overcured five minutes beyond the normal curing time a metal-cement separation occurred. If Chemlok 203 and 220 were used, the five-minute overcure produced perfect bonds. If the parts were grit blasted instead of solvent cleaned, the five-minute overcure again produced perfect bonds with Chemlok 220 alone.

A very interesting study of other effects of metal surface preparation was recently made in the Hugh Lord laboratory by W. M. DeCrease. This study, results of which are shown in Table 3, compared the results obtained in bonding an NR compound to magnesium prepared by three surface treatment methods:

1. Degrease in trichloroethylene.
2. Degrease, grit-blast, degrease.
3. Chemical treatment—Dow Treatment No. 1 (5-step chrome-pickle process) (6).

Parts bonded with Chemlok 220/203, which showed 100% rubber breaks with all three surface preparation methods, were further tested by immersing them for two hours in boiling water, with high stress on the bond interface during exposure. Results are given in Table 4.

The study shows that in this bonding application Chemlock 220 alone produced a 100% rubber tearing bond only when the metal was chemically treated. Chemlok 203 and 220 together produced rubber tearing bonds with all three surface treatments. The boiling water test showed a difference in resistance of the Chemlok 203/220 bond to this exposure, depending on the surface treatment used. Only the chrome pickle process produced a totally resistant bond. It is apparent that the total bonding process should be considered in the selection of surface preparation methods, and that there is an unprecedented range of choices available to the user of Chemlok adhesives.

Adhesive Application Methods

Both laboratory tests and production experience have shown that Chemlok adhesives may be successfully applied to metal parts by brushing, dipping, spraying, roller coating, wiping, flow coating, and tumbling. Special applicators used in the wire and cable industry produce equally excellent results.

Metal parts may be heated prior to adhesive coating in order to hasten drying, or they may be passed through drying tunnels or other fast-drying equipment after coating.

The drops of adhesive that sometimes form at the bottom of drying metal parts, frequently referred to as "tears," have always been sources of trouble in the past. While tears on Chemlok-coated parts are not always troublefree, especially if they are not thoroughly dried, they have comparatively little effect on bond strength. The same is true for other types of adhesive build-up caused by running of the adhesive before drying.

A most important advantage of the use of the Chemlok 203 and 220 system is the avoidance of errors in application. The gray color of Chemlok 203 and the black color of Chemlok 220 are unmistakable. Since no other adhesives are necessary in most rubber-to-metal bonding applications, it is easy to avoid costly mistakes caused by using the wrong adhesive and only discovering the error when the bonded part fails.

Metal Parts Handling

The tender loving care which adhesive-coated metal parts required in former days is no longer necessary for the production of good bonded assemblies. The question, "How long can metal parts be held between coating and bonding?", can now be answered in months

TABLE 5. EFFECT OF LAYOVER TIME ON ADHESION OF AN NR COMPOUND (HC 101) BONDED WITH CHEMLOK 220 WHICH WAS APPLIED TO METAL* ON OCTOBER 2, 1958

		Test Results	
Date of Bonding	Layover Time	Lbs./In.	% Rubber
Oct. 9, 1958	1 week	67	100
Nov. 3, 1958	1 month	71	100
Dec. 8, 1958	2 months	62	100
Apr. 13, 1959	6 months	66	100
Oct. 19, 1959	1 year	60	100
Oct. 12, 1960	2 years	62	100
Feb. 27, 1961	2.4 years	65	100

* Cold rolled steel was used for tests reported in tables 5 through 9. The metal surface was prepared by degreasing, grit blasting, and again degreasing.

TABLE 6. ADHESION OF AN NR COMPOUND (HC 101) WITH PREBAKED TWO-PART COATING OF CHEMLOK 203/220 APPLIED TO COLD ROLLED STEEL

	Test Results	
Baking Conditions	Lbs./In.	% Rubber
No prebake	62	100
5 min. @ 320° F.	68	100
10 min. @ 320° F.	60	100
20 min. @ 320° F.	64	100
10 min. @ 300° F.	70	100
30 min. @ 300° F.	61	100

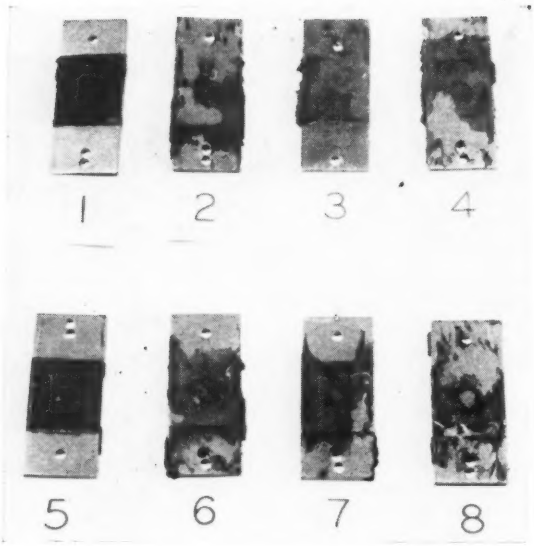

Fig. 1. Test samples illustrating the sweeping of adhesive during molding. Samples 1 to 4 were bonded with one-coat system. Samples 5 to 8 were bonded with two-coat system. Sample 1 is Chemlok 220; and sample 5, Chemlok 203/220

instead of hours.

In October, 1958, a test program was begun to determine the effect of layover time between adhesive coating and bonding. At that time a number of cold rolled steel parts were coated with Chemlok 220 and stored. At frequent intervals thereafter some of the metal parts were taken for bonding and testing. The last parts tested prior to this report were bonded in February, 1961, more than two years after coating. Table 5 shows that original bond strength was retained during the entire course of this test program.

Dried films of Chemlok 203 and 220 are quite resistant to the impact and abrasion forces encountered during handling. Coated metal parts may be loaded into tote boxes immediately after drying without endangering results. Some chipping of the adhesive film almost always takes place during rough handling, but unless the damage is in high stress areas, there is little effect on the bond. If the damage is at a point on the metal part where the bond interface is subjected to high stress during the service life of the finished assembly, it is likely to be a starting point for a progressive separation of rubber and metal which will cause the assembly to fail. Stress points are often located at corners or edges, where damage is most likely to occur. Judicious use of a touch-up brush to repair damage at these points has proved to be effective.

Variations in Compounding

Elastomer compounders have literally hundreds of available materials from which to choose those necessary for the development of required physical properties. Chemlok 203 and 220 have proved to be more tolerant than other adhesive systems, both to choice of ingredient and to the amount used in the compound.

An excellent treatment of this subject is available in an article, "Compounding Elastomers for Rubber-to-Metal Adhesion," by William M. DeCrease (7).

Effect of Bonding Procedures

Probably the most dramatic advances in the practice of rubber-to-metal bonding caused by the use of Chemlok 203 and 220 have been in the bonding process itself. Production men have frequently been troubled by bond failures caused by "wiping" or "sweeping," that is, by displacement of the adhesive from the metal caused by flow of the elastomer stock during the molding process.

Since no laboratory test was known which adequately duplicated this condition, Hughson engineers designed a new test method which has been very successful. This test utilizes a mold which subjects the adhesive-coated metal to severe sweeping forces during transfer molding. In this test only a one-inch-square portion of the metal is coated, and any movement of the adhesive during molding is evident when the rubber is peeled from the metal. This test is so severe that some adhesives which perform adequately in most production operations may sweep considerably during testing. Figure 1 shows the excellent sweep resistance of Chemlok 203 and 220 compared with that of some other available adhesives.

When coated metal parts are loaded into a multiple-cavity mold, the first few parts loaded are heated to mold temperature for the remainder of the loading period. This prebaking of the adhesive is a common cause of bond failure. Table 6 shows the resistance of Chemlok 203 and 220 to adhesion loss during extended prebaking times at full molding temperature.

Desirable non-wiping and prebaking characteristics tend to minimize low-temperature activity, and for this reason best results with Chemlok adhesives are obtained at curing temperatures above 250° F.

In addition to superb press curing properties, Chemlok adhesives adapt perfectly to open steam, autoclave,

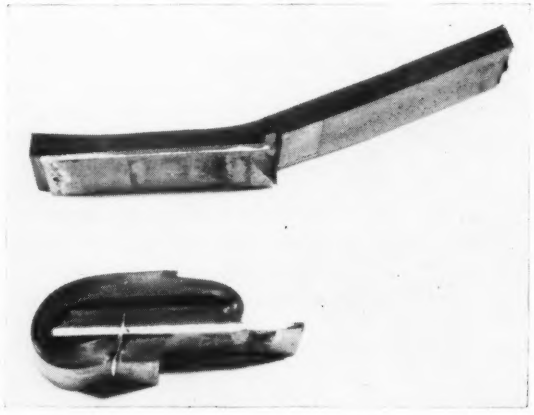

Fig. 2. An unstressed sample *(top)* is bent around and wired *(bottom)* to prepare a test piece for environmental resistance test in order to place high peel stress at the bond interface

TABLE 7. ENVIRONMENTAL RESISTANCE OF CHEMLOK BONDS UNDER A VARIETY OF CONDITIONS

Conditions	Compound	% Rubber Chemlok 220	% Rubber Chemlok 203/220
JP-4 fuel, 3 days @ 158° F.	HC 302	100	100
Salt spray, 64 hours	HC 202	70	100
ASTM oil #3, 3 days @ 158° F.	HC 302	100	100
Boiling water, 2 hours	HC 202	70	90
Hydraulic brake fluid, 3 days @ 158° F.	HC 600	90	100
Ethylene glycol, 7 days @ 158° F.	HC 610	100	100
Turbo oil #15, 7 days @ 158° F.	HC 612	0	85

* % rubber remaining on the metal after failure is the only figure reported because of deterioration of the elastomer compound during some of the tests.

and continuous vulcanization processes. Production methods used in roll building, in wire and cable construction, and in tank lining are equally satisfactory.

Unusually short cure times are common in continuous vulcanization procedures used in the wire and cable industry. Long cure times are used in some molding applications, and frequent overcuring also occurs, either accidentally or intentionally. Chemlok adhesives bond very well under these varying conditions.

Damage caused during removal of hot bonded parts from the mold has always been the cause of high scrap losses, in spite of careful handling. The exceptional hot strength of Chemlok adhesives minimizes such damage, and resultant savings have more than paid total adhesive costs in many plants.

Environmental Resistance

The ability of a bonded assembly to resist destructive environmental conditions to which it may be exposed is vital to its function in service. Chemlok 220 alone produces bonds with resistance comparable to that obtained with two-coat systems used in the past; while Chemlok 203 and 220 together show a considerably improved degree of resistance.

Some manufacturers have been troubled with corrosion appearing between CR and metal in certain applications. No case of this type of corrosion has yet occurred in parts bonded with Chemlok 203 and 220.

The bonded specimens obtained by using ASTM D 429-58, Method B,[2] are well suited to environmental resistance tests. Figure 2 shows how a specimen is prepared for such tests by placing high stress on the bond interface.

The severity of this stressed sample test is indicated by the fact that unstressed specimens may be boiled in water for three days without bond separation; while stressed samples will usually show signs of separation in two hours.

Table 7 shows the results of environmental resistance tests utilizing several commonly encountered destructive conditions.

[2]American Society for Testing Materials, Philadelphia, Pa., D 429-58, Methods of Test for Adhesion of Vulcanized Rubber to Metal.

Dilution Effect

Two effects are desirable when an adhesive is diluted with varying amounts of solvent:

1. The adhesive should retain 100% bond strength after considerable dilution.
2. When bond strength declines as dilution is further increased, it should decline uniformly so that different adhesion levels and economies may be obtained for different requirements.

A study performed by R. P. Stout in the Hugh Lord laboratory contrasted the behavior of Chemlok 220 with other adhesives at different dilutions. Mr. Stout reported his results in the article, "Systematic Control of Rubber-to-Metal Adhesion in the Wire and Cable Industry" (8). Mr. Stout stated:

"Certain commercial adhesives of wide versatility and high chemical reactivity perform more consistently when diluted than others. In one situation which we studied, several adhesives all gave rubber tearing bonds at normal concentration and film thickness. All were then tested at greater and greater dilutions on the same rubber stock. One chemically active adhesive gave reproducible and intermediate adhesion values even on greatly diluted samples. Other adhesives became erratic even when only diluted a little, and completely lost ability to bond after moderate dilution. Thus, if other elements in the system can be held constant and a capable adhesive used, intermediate degrees of adhesion can be obtained by diluting the adhesive to an appropriate level."

Table 8 shows the excellent performance of Chemlok 220 diluted with varying amounts of toluene.

Long shelf life is a desirable property of any chemical product used in industry. There are, however, different degrees to which various products retain their original properties during extended storage periods. Table 9 shows the ability of Chemlok 203 and 220 to retain 100% performance after extended time intervals.

Laboratory vs. Production Experience

The preceding data sum up the significant laboratory

TABLE 8. EFFECT ON THE BOND OF AN NR COMPOUND (HC 101) TO COLD ROLLED STEEL BY THE DILUTION OF CHEMLOK 220 WITH TOLUENE. (DILUTION RATIO BY VOLUME)

Parts Toluene per 100 Chemlok	Test Results Lbs./In.	Test Results % Rubber
No dilution	63	100
25	59	100
50	63	100
100	42	80
200	36	55
400	28	40

TABLE 9. EFFECT OF ADHESIVE AGING ON BOND STRENGTH

Age of Adhesive	Chemlok 203, HC 600		Chemlok 220, HC 101	
	Lbs./In.	% Rubber	Lbs./In.	% Rubber
6 months	84	100	62	100
1 year	76	100	68	100
1½ years	80	100	59	100
2 years	85	100	62	100
3 years	77	100	64	100

aspects of the performance of Chemlok 203 and 220. The test method used to procure most of the data, ASTM D 429-58, Method B, has been generally accepted in the industry because it is fast, simple, inexpensive, and reasonably reliable and reproducible. The bonded specimens are excellent for environmental resistance tests. The other tests reported require little special equipment and may be duplicated in most laboratories.

Maximum performance of a rubber-to-metal bond tested by ASTM D 429-58 Method B is easily obtained because it requires only two conditions:

1. The bonding area of the metal must be 100% covered by the elastomer compound after failure of the test specimen.
2. A reasonable value in pounds per linear inch must be obtained in separating the rubber from the metal. This value is related to the tear properties of the rubber when the metal is 100% rubber covered.

But what about differences in bond strength among specimens that show maximum performance? This test does not detect such differences, and until recently no other available test method has displayed sufficient sensitivity to do so.

A new test method was recently reported by G. W. Painter (9). The essence of this method is a new metal part with a conical bonding surface, as shown in Figure 3.

If conical bonded specimens are prepared using the same base metal, adhesive, and elastomer compound as in ASTM D 429-58 Method B, failure is almost never found entirely in the elastomer. The numerical value obtained in testing, expressed in pounds required to separate the metal parts, is, therefore, meaningful as a measurement of bond strength. This test approaches more nearly than any other published method the measurement of the true strength of the rubber-to-metal bond, or the quality sometimes referred to as "intrinsic adhesion" (10).

As the Painter conical test achieves more widespread recognition and adoption, significant advances will be made in evaluating adhesive performance.

One of the most distressing conditions encountered throughout the history of rubber-to-metal bonding has been the lack of correlation between the performance of an adhesive in the laboratory and its performance in production and in field service. Regardless of its performance under closely controlled laboratory conditions, an adhesive must pass the more rigorous test of long-term production usage if it is to be successful.

Almost five years of factory experience have provided ample evidence that not only can the laboratory performance of Chemlok 203 and 220 be substantiated in production usage, but the superior factory performance of these adhesives is beyond the ability of present laboratory test methods to demonstrate it adequately.

Current Practices

A comparison of present bonding practices with their pre-Chemlok counterparts will clearly show the influence of the widespread use of Chemlok 203 and 220.

Again referring to the observer who reported that in 1957 about 30% of bonded products produced in the United States are made with one-coat adhesives (1), we find that he reported in 1960 that an estimated 55% utilized only one coat (11). This increase of nearly 100% in the use of one-coat adhesives has been almost entirely due to the influence of Chemlok 220 when used for bonding NR and SBR. It is also interesting to note that the same authority estimates a reduction in brass plate bonding from 20% to 15% in the same period of time (11).

Changes in processing have favored simplification and increased latitude in several areas.

1. Metal Surface Preparation. Surface treatment methods have been liberalized considerably during the last four years. Many continuous chemical processing installations have been put in service to prepare steel surfaces for bonding. Chemical methods for copper and its alloys, for aluminum, magnesium, and stainless steel are already well established. Several successful bonding operations use steel surfaces prepared only by degreasing, a virtual impossibility only a few years ago.

Most surface treatment procedures today, however, still follow the historical pattern of degrease and grit blast, sometimes followed by a second degrease. Although such exacting procedures are not strictly necessary in modern bonding practice, they are effective in preserving latitude for subsequent steps in the bonding process.

2. Adhesive Selection. The problem of selecting the proper adhesive for a specific bonding application has been tremendously simplified. Although not every com-

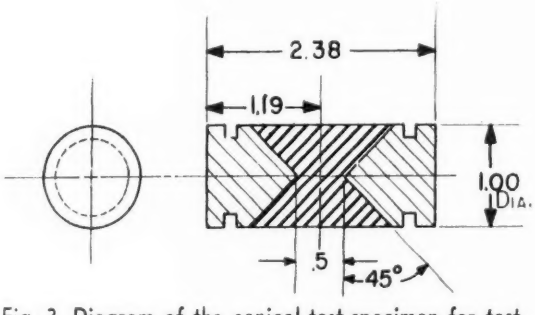

Fig. 3. Diagram of the conical test specimen for testing rubber-to-metal adhesion

pound of the five commonly used elastomers can be bonded to all metals with the Chemlok 203 and 220 system, these adhesives have achieved a batting average that can only be described as phenomenal. Probably 95% of all production applications involving the bonding of these elastomers to metals, plastics, and other rigid substrates can be successfuly handled with Chemlok 203 and 220.

For some unusual compounds, or for limited purpose use where adhesive versatility is not a requirement, Chemlok 225 and 226 are sometimes used. Another Hughson adhesive introduced some time ago on a field-trial basis, EX-B501-4, has proved to be an excellent product for single coat CR and NBR bonding applications.

During the last five years the use of silicone rubbers, fluorinated elastomers, polyurethane elastomers and other special purpose products has increased tremendously to keep pace with the severe service requirements of the space age. Chemlok 607 has proved to be a versatile adhesive for bonding these specialty elastomers, and it is performing excellently in production use. A discussion of this adhesive is not within the scope of this article.

3. Elastomer Compounding. There have been some very interesting changes in compounding during the last three or four years. When the immense versatility of Chemlok 220 in bonding diverse compounds first became an established fact, compounders were able to escape from a very frustrating situation. Until that time they were faced with this dilemma: if they devised rubber stocks able to satisfy demands for improved physical properties or for lower cost, they had bonding difficulties; if they stayed within the compounding limitations imposed by bondability with available adhesives, they had trouble meeting performance specifications or cost ceilings.

By using Chemlok 220, compounders escaped these difficulties. Their problem stocks would now bond easily, and the prospect of still further compounding latitude was most inviting. By broadening compounding practices, especially with SBR and IIR, they eventually explored the performance limitations of Chemlok 220. Now the more venturesome compounders are again faced with the same old dilemma, but at an expanded level of freedom.

4. Factory Processing. When some future historian writes the story of Chemlok adhesives, he is likely to say that the greatest contribution these products have made to improving the art of rubber-to-metal bonding has been troublefree operation in the factory. Production men know this, even though laboratory tests cannot show it. The Hughson files contain many interesting case histories.

Heat and humidity have in the past been the ruination of countless bonded parts and have been blamed for the ruination of countless others because the real cause was not known. Bonding procedures then in use with adhesives then available were so lacking in tolerance that any minor deviation from standard practice anywhere along the line was liable to cause immediate disaster. Excessive heat and humidity were sometimes the causes, often the convenient scapegoats. Chemlok 220 and 203 perform perfectly in high heat and humidity; so they eliminate these sources of trouble. Being rugged production performers, they also operate under other marginal conditions which were formerly extremely troublesome.

The Total Process Concept

Only by considering the entire rubber-to-metal bonding process as a single entity can the full potential of an exceptionally versatile adhesive system be appreciated and exploited. The laboratory data here presented show several of the relations that exist between segments of the bonding process, and production experience and field results further illustrate this interdependence.

The versatility and latitude inherent in the Chemlok system in all the related aspects of the bonding process present interesting possibilities for the manufacturer. Extra latitude may be used in one processing area if standard procedures are followed in a related area, and, conversely, strict procedures in one part of the process allow liberties in another. Intentional use of this knowledge allows the manufacturer to set up his production system in an almost infinite variety of ways to suit his own specific conditions and requirements.

This interchange of latitude also takes place without conscious direction. Its automatic operation is undoubtedly responsible for the lack of processing difficulties with Chemlok adhesives noticed by production men all over the world. It is a built-in error compensator which takes in stride the many little processing faults which often totally wrecked rubber-to-metal bonding operations in the past.

The total process concept is also necessary in considering two other matters:

1. *One-Coat vs. Two-Coat Adhesive Applications.* One coat of Chemlok 220 is an entirely adequate adhesive system for bonding NR, SBR, and IIR to most metals when the bonded assembly is not to be subjected to extreme environmental conditions. It is successful for CR bonding unless corrosion between CR and metal has proved to be a problem. The two-coat system of Chemlok 203 and 220 has more inherent tolerance in surface preparation, elastomer compounding, processing procedures, and environmental resistance. A manufacturer may select either system, depending on his own individual production facilities and finished parts requirements.

Factors favoring the selection of Chemlok 220 as a one-coat system are as follows:

a. Use of considerable time and labor in adhesive application.

b. Existence of adequate surface preparation methods.

c. Established processing procedures adequate for earlier two-coat adhesive systems.

d. Normal environmental resistance requirements.

Factors favoring two-coat application of Chemlok 203 and 220 follow:

The Author

Joseph W. Gallagher, manager of marketing department, was graduated from the University of Pittsburgh with a B.S. in Business Administration in 1932. Mr. Gallagher has been active with the Hughson Chemical Co., a division of Lord Mfg. Co., since its inception, in establishing marketing objectives and programs and has had extensive contact with all segments of the rubber industry.

a. Minimum metal surface preparation required or desired.

b. Need of maximum environmental resistance.

c. Use of wide variety of metal-elastomer combinations.

d. Desirability of uniform processing for all bonded parts, whether two-coat performance is necessary or not.

The concept of uniform two-coat processing for all bonded parts is a very interesting one. This system has been used to avoid the necessity of laboratory tests to establish bondability and environmental resistance, to avoid any possible chance of error in adhesive application, and to avoid concern over strict processing control. Its cost is justified by some users as a sort of bonding insurance.

2. *Economy of Operation.* Many manufacturers of bonded assemblies use Chemlok adhesives in order to produce the best possible bonded products, regardless of adhesive cost. Many others use Chemlok because they are involved in severely competitive situations and must have the lowest possible cost per serviceable bonded unit.

The numerous individual economies of the use of Chemlok adhesives have been mentioned. The total process concept explains why these economies may be added up in so many different ways to produce results in total savings far outweighing any conceivable effect of price per gallon paid for adhesives. Reduction in scrap losses alone has enabled many manufacturers to save several times the total cost of their adhesives. Others have reported similar savings by replacing high-cost elastomer compounds, by avoiding production down time, and by fewer failures in field service. Further economies are being investigated by several firms who have already enjoyed substantial savings, because they believe they have not yet explored the full economic potential of the adhesives.

Adhesive Needs of the Future

Although the art of rubber-to-metal bonding has been considerably advanced by the use of Chemlok 220 and 203, further progress would be most welcome to all producers of bonded assemblies. The industry does not need equivalents of these adhesives, or marginal improvements. The adhesives of the future must be giant-step advances which will not only fill some existing performance gaps and further simplify processing, but which will also enlarge the boundaries of present-day technology.

Is it unreasonable to expect a new one-coat adhesive with the versatility and processing latitude of Chemlok 203 and 220 together and also the ability to accommodate new compounding techniques now considered impractical? Should we not expect this same one-coat adhesive to have the environmental resistance of Chemlok 203 and 220 together and also resistance to environments now considered ruinous to both bond and elastomer? A big order, certainly, but only by pursuing worthy objectives can research fulfill its obligation to provide industry with the tools required to fashion future progress.

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■

Butyl Mat for Safer Play

A butyl rubber mat for use under playground equipment is designed to protect children from serious injuries resulting from falls. The mat will absorb the impact of a falling body without "bottoming." The under side of the mat is composed of one-inch-square ribs with four smaller recessed rib cells within the larger square. The outer layer of ribbing allows adequate deceleration and wide distribution of impact. The inner ribs prevent the bottoming effect.

Called Safety-Surf, the mat is made in two-foot-square interlocking sections with beveled border and corner blocks anchored to the surface. Safety-Surf is a product of Mitchell Rubber Products, Inc., Los Angeles, and is made from Enjay butyl.

LOOK! LISTEN!! LEARN!!!

Audio-Visual Production Line Instructor

New compact unit provides individual training or instructions to break in new workers or lead them through complicated assemblies with a constant program devised by the company's own supervisors

A NEW audio-visual unit which provides a synchronized sound and slide presentation of any training or manufacturing program has been introduced to industry. The new system, called the Audio Graphic System, was developed by Graflex, Inc., a subsidiary of General Precision Equipment Corp., Rochester, N. Y.

The individual unit allows the worker to perform his operations while following uniform audio-visual instructions, thus constantly maintaining desired quality standards at minimum costs. For training, the machine permits the use of identical instructions to each and every worker as he is hired, without taking time from busy supervisors.

One of the chief advantages of the new system is the ease with which companies can prepare their own Audio Graphic programs. Recording is done on the basic unit. Any standard 35-mm. camera is used to prepare the slides.

In addition to training new personnel, the system may be used to instruct operators in short-cycle assemblies, give continuous guidance on long operations, teach equipment repair and adjustment, show machine set-up, quality control, calibration of instruments, servicing of products, safety training, methods training and explanation, and personnel testing and rating.

Guide to Process Steps

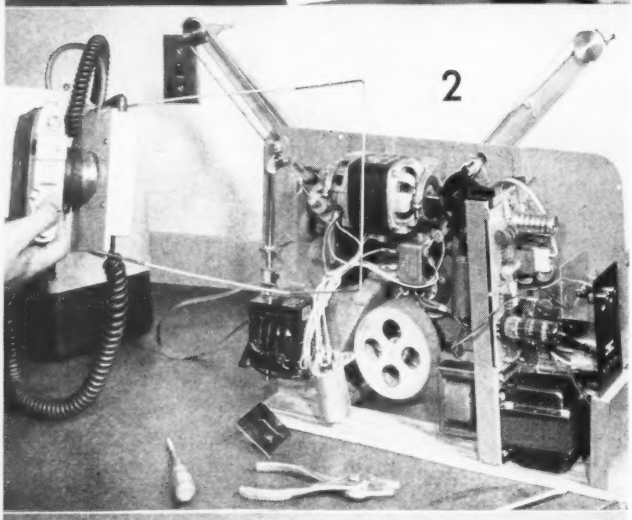
On long-cycle jobs the programmed instructions can guide the worker through each step of the process. Where a limited number of items is to be produced on a relatively infrequent basis, the stored verbal and visual instructions may be used as a retraining device for previously learned procedures.

Basis of the system is the playback or Instructor unit which occupies a space 17 by 15 by 13 inches. The unit contains a 35-mm. rear projection screen with an ample 80-square-inch area (8 by 10 inches), amplifier, tape deck, speaker, earphones, volume control, and operator controlled foot-switches. The 35-pound unit, powered by 105-120 volt, 60-cycle current, uses only 250 watts of power. A slave projector may be connected to the Instructor unit for big-screen showings before groups. A programming accessory complete with microphone provides controls for recording levels, stop signals, and time-delay pulses. For recording purposes the programming unit plugs into any instructor machine. A timing accessory is available that permits the instructor unit to restart itself after having stopped for a predetermined time between steps and thus pace the operation.

Operation Is Simple

The preparation of the program is very simple and is readily handled by supervisors, engineers, quality-control people, and any others of the company staff involved. An outline of the program is made including the list of pictures needed to illustrate the steps of a specific operation. The 35-mm. pictures are taken by the staff members and processed into slides. These slides are placed in the slide magazine of the Instructor unit being used, and the programming accessory is plugged in. The control is pushed to insert a slide in the viewer and to place a pulse on the tape which will activate this slide during playback. The previously prepared commentary is read on to the magnetic tape while the slide is being observed. At this point the next slide may be inserted, or the tape may be stopped. The picture will remain on the screen until the next sequence is started. The next slide will appear upon demand of the operator by use of the foot-switch or by use of the timing accessory, at the time set in on the tape by pulses.

The portable system can be used without upsetting the routine or physical layout of the production line



or work space. Operators receive the audio through the built-in speaker or through earphones which are attached to a conveniently located jack. The speaker automatically shuts off upon insertion of the phone jack, but if at any time the supervisor or other workers should desire to hear, the speaker may be restarted by removal of the jack plug.

The versatile system thus lends itself to three types of operation:

- **Continuous operation.** Pictures and synchronized sound automatically change from start to finish without interruption.
- **Demand operation.** Tape mechanism automatically stops at the end of each block of commentary, leaving the accompanying picture on the screen for constant reference. When the operator is ready for the next instruction, he presses the foot-switch, restarting the tape.
- **Timed operation.** Similar to "demand" except the machine automatically restarts after a predetermined time interval. This method is ideal for timed performance testing, aptitude tests, and pacing exercises.

Rewards Can Be Great

The equipment uses a reversible four-channel magnetic tape two channels on each side, with the spoken commentary on one of the channels, and the electronic impulses on the other. While the tape normally plays for a half-hour period, use of the demand or timed method of operation can lengthen this time since the tape does not run while the verbal portion of the instruction is stopped.

Studies show that industrial users of audio-visual instruction have realized assembly time savings as high as 50%; rejects have dropped as much as 90% due to fewer errors; inspection manpower can be reduced as much as 85%; supervision cut 70%; and rework cut 85%. The Audio Graphic System provides instruction or guidance that is always complete, concise, identical, and adaptable regardless of locale or time lapse between uses.

Fig. 1. Key company personnel hold a group planning conference to determine best procedure for audio-visual instruction of a specific operation. The script is written, and slides outlined

Fig. 2. A 35-mm. camera is used to prepare the slides for visual presentation of each job step

Fig. 3. Step-by-step verbal instructions are matched to the slides on magnetic tape, using a programming accessory

Fig. 4. The Audio Graphic System gives worker consistent detailed instructions for each step of the work

Available Dry Synthetic Rubbers Except SBR—IV[1]

Polysulfide Rubbers

Thiokol LP-2

COMP: Organic polysulfide liquid polymer.
SUP: Thiokol Chemical Corp.
PHY PROP: Non-toxic, amber-colored liquid with slight mercaptan odor, and reactive mercaptan terminals. Viscosity, 400 ps. Molecular weight, 4000. Crosslinking ability, 2%. Sp. gr., 1.27.
PROC PROP: Compounded with fillers, reinforcers, and resin adhesive additives on a three-roll paint mill, kneading machine, or homogenizer. Oxidizing agents, primarily of the metallic peroxide type, polymerize or convert the liquid polymer, at room temperature, to a highly resilient rubber with tensile strength as high as 1200 psi. Epoxies also function effectively as room-temperature curing agents.
VUL PROP: Vulcanized compounds possess excellent resistance to oils, organic solvents, weathering, low temperatures, gas permeability, and oxidation. Can also be compounded to provide good to excellent ozone, heat, and moisture resistance. Since no solvents are present in the polymer, curing occurs with little or no shrinkage. Vulcanizates have elongation and resilience comparable to those of NR, but with lower tensile strength and abrasion resistance. Durometer hardnesses in the range of 5-90 can be obtained. Used for calking and sealing materials, coatings, flexible molds and patterns, modifying and flexibilizing epoxies, impregnating leather, cast rolls, poured-in-place gaskets, pottings, and adhesives.

Thiokol LP-3

COMP: Organic polysulfide liquid polymer.
SUP: Thiokol Chemical Corp.
PHY PROP: Non-toxic, amber-colored liquid with slight mercaptan odor, and reactive mercaptan terminals. Viscosity, 10 ps. Molecular weight, 1000. Crosslinking ability, 2%. Sp. gr., 1.27.
PROC PROP: Same as Thiokol LP-2.
VUL PROP: Same as Thiokol LP-2.

Thiokol LP-8

COMP: Organic polysulfide liquid polymer.
SUP: Thiokol Chemical Corp.
PHY PROP: Non-toxic, amber-colored liquid with slight mercaptan odor and reactive mercaptan terminals. Viscosity, 3 ps. Molecular weight, 300. Crosslinking abilities, 2%. Sp. gr., 1.23.
PROC PROP: Same as Thiokol LP-2.
VUL PROP: Same as Thiokol LP-2.

Thiokol LP-31

COMP: Organic polysulfide liquid polymer.
SUP: Thiokol Chemical Corp.
PHY PROP: Non-toxic, amber-colored liquid with slight mercaptan odor, and reactive mercaptan terminals. Viscosity, 1200 ps. Molecular weight, 7500. Crosslinking ability, 0.5%. Sp. gr., 1.31.
PROC PROP: Same as Thiokol LP-2.
VUL PROP: Same as Thiokol LP-2.

Thiokol LP-32

COMP: Organic polysulfide liquid polymer.
SUP: Thiokol Chemical Corp.
PHY PROP: Non-toxic, amber-colored liquid with slight mercaptan odor, and reactive mercaptan terminals. Viscosity, 400 ps. Molecular weight, 4000. Crosslinking ability, 0.5%. Sp. gr., 1.27.
PROC PROP: Same as Thiokol LP-2.
VUL PROP: Same as Thiokol LP-2.

Thiokol LP-33

COMP: Organic polysulfide liquid polymer.
SUP: Thiokol Chemical Corp.
PHY PROP: Non-toxic, amber-colored liquid with slight mercaptan odor, and reactive terminals. Viscosity, 15 ps. Molecular weight, 1000. Crosslinking ability, 0.5%. Specific gravity 1.27.
PROC PROP: Same as Thiokol LP-2.
VUL PROP: Same as Thiokol LP-2.

Thiokol Polysulfide Crude A

COMP: Organic polysulfide rubber.
SUP: Thiokol Chemical Corp.
PHY PROP: Non-toxic, non-staining, light yellow, rubber-like solid with sulfurous odor. Sp. gr., 1.60. Modified Williams plasticity (standard compound), 130-170.
PROC PROP: Conventional mill and molding equipment is used. Peptized by use of combinations of benzothiazole disulfide and diphenyl guanidine. Reinforcing fillers required, usually furnace carbon blacks. Must be cured under pressure to prevent blowing and pock marking. A gas with strong odor is emitted while hot, thus good ventilation is required. Compatible with commonly used rubbers, except IIR.
VUL PROP: Oil-resistant type. Possesses extreme resistance to powerful organic solvents such as benzene, carbon tetrachloride, and methyl ethyl ketone. Also is very resistant to water, ozone, and sunlight. Has poorer original tensile strength and elongation than some polymers, but maintains these properties much better after immersion. Recommended for use from 0-150° F. Found to be a valuable agent for use in sulfur cements.

[1] Continued from our August issue, p. 77.

Thiokol Polysulfide Crude FA

COMP: Organic polysulfide rubber.
SUP: Thiokol Chemical Corp.
PHY PROP: Non-toxic, non-staining, light tan, rubber-like solid with mild sulfurous odor. Sp. gr., 1.34. Modified Williams plasticity (standard compound), 120-150.
PROC PROP: Conventional mill, Banbury, calender, extruder, vulcanizer, and mold equipment are used. Molded items must be cooled prior to removal from mold to prevent pock marking; otherwise no special handling is required during curing. Peptized by use of combinations of benzothiazole disulfide and diphenyl guanidine. Reinforcing fillers are required, usually furnace blacks. Compatible with commonly used rubbers, except IIR.
VUL PROP: Oil-resistant type. Outstanding solvent resistance to alcohols, ketones, esters, gasolines, test fuels, petroleum oils, most aliphatic and aromatic solvents, and dilute acids and bases. Highly impermeable to gases, water, and organic solvents. When properly compounded, is extremely resistant to ozone, sunlight, and weathering. Possesses poor compression set. Recommended for use from —50 to +250° F. Some applications are paint spray, gasoline and aromatic fuel hoses, printing and can coating rolls, permanent putties and sealers, binder for cork, and coating for paper gaskets.

Thiokol Polysulfide Crude ST

COMP: Organic polysulfide rubber.
SUP: Thiokol Chemical Corp.
PHY PROP: Non-toxic, light tan, rubber-like solid with mild sulfurous odor. Sp. gr., 1.25. Mooney plasticity, 25-35.
PROC PROP: Conventional mill, calender, vulcanizer, extruder, and mold equipment are used. Can be cured in molds, hot air, and open steam. Is the polysulfide crude best suited for molded goods because items can be removed while hot. No peptizing agent is normally needed. Reinforcing fillers, usually furnace carbon blacks, are required. Compatible with NBR and CR.
VUL PROP: Oil-resistant type. Excellent resistance to alcohols, ketones, esters, gasolines, test fuels, petroleum oils, most aliphatic and aromatic solvents, and certain dilute acids and bases. Is highly impermeable to gases, water, and organic solvents. When properly compounded, is virtually unaffected by ozone, sunlight, and weathering. Possesses good compression set at 158° F. Has the best low temperature flexibility of the polysulfide crudes. Usable continuously at 212° F., intermittently to 300° F. Some applications are O-rings, gaskets, coating rollers, and gas-meter diaphragms.

Silicone Rubber

SE-30

COMP: Methyl-type silicone rubber gum.
SUP: General Electric Co. (Silicone Products Dept.).
PHY PROP: Sp. gr., 0.98. Williams plasticity no. (ASTM D 926, room temperature, 3 minutes), 95-125. Low shrinkage. Clear, viscous, polysiloxane polymer.
PROC PROP: Gum stock and starting point for compound operation which results in general-purpose, low-shrink silicone rubber compounds. Easy to compound, readily accepts fillers.
VUL PROP: General purpose, low shrink.

SE-33

COMP: Methyl vinyl-type silicone rubber gum.
SUP: General Electric Co. (Silicone Products Dept.).
PHY PROP: Low shrinkage. Sp. gr., 0.98. Williams plasticity no. (ASTM D 926, room temperature, 3 minutes), 110-175. Clear, viscous, polysiloxane polymer.
PROC PROP: Gum stock and starting point for compounding operation which results in low-shrink and low compression set compounds. Easy to compound, readily accepts fillers and color additives.
VUL PROP: High-temperature and low-compression set compounds with good electrical properties. Useful temperature range, —80 to 500° F.

SE-40

COMP: Methyl vinyl-type reinforced silicone rubber gum.
SUP: General Electric Co. (Silicone Products Dept.).
PHY PROP: Off-white. Sp. gr., 1.10.
PROC PROP: Gum stock into which reinforcing silicas have been compounded. Additional fillers may be added to vary physical properties, forming a series of low compression set, general-purpose compounds. Handles well, accepts filler readily.
VUL PROP: Low compression set with excellent electrical properties. Temperature range, —80 to 500° F.

SE-52

COMP: Methyl phenyl-type silicone rubber gum.
SUP: General Electric Co. (Silicone Products Dept.).
PHY PROP: Low shrinkage. Sp. gr., 0.98. Williams plasticity no. (ASTM D 926, room temperature, 3 minutes), 135-180. Clear, viscous, polysiloxane polymer.
PROC PROP: Gum stock and starting point for compounding operation which results in low-shrink, extreme low-temperature compounds. Easy to compound, readily accepts filler.
VUL PROP: Service temperature range to —130° F.

SE-54

COMP: Methyl phenyl vinyl-type silicone rubber gum.
SUP: General Electric Co. (Silicone Products Dept.).
PHY PROP: Low shrinkage. Sp. gr., 0.98. Williams plasticity no. (ASTM D 926, room tempera-

ture, 3 minutes), 120-170. Clear, viscous, polysiloxane polymer.

PROC PROP: Gum stock and starting point for compounding operation resulting in low-shrink, low-temperature, low compression set materials. Easy to compound, accepts filler readily.

VUL PROP: Service temperature range, —130 to 500° F.

SE-76

COMP: Methyl-type silicone rubber gum.

SUP: General Electric Co. (Silicone Products Dept.).

PHY PROP: Sp. gr., 0.98. Williams plasticity no. (ASTM D 926, room temperature, 3 minutes), 70-115. Clear, viscous, polysiloxane polymer.

PROC PROP: Gum stock and starting point for compounding operation which results in high-shrink silicone rubber compounds.

VUL PROP: General purpose.

SE-100

COMP: Silicone rubber.

SUP: General Electric Co. (Silicone Products Dept.).

PHY PROP: White, sp. gr., 1.2, putty-like 100% solids material.

PROC PROP: Can be applied to cloth, sleeving, and wire, using standard-dip or knife-coating techniques.

VUL PROP: Outstanding physical and electrical properties.

SE-404

COMP: Methyl vinyl-type reinforced silicone rubber gum.

SUP: General Electric Co. (Silicone Products Dept.).

PHY PROP: Low shrinkage. Off-white to light-straw-colored. Sp. gr., 1.10.

PROC PROP: Can be compounded to high-strength or low-cost stocks, depending upon the type filler added to it. Accepts additional fillers rapidly and takes large quantities of extending fillers. Medium firm, easily worked. Must be compounded and handled on clean equipment.

VUL PROP: Long freshened life. General purpose. Reinforced gum alone, with no added filler, can yield a 45-durometer rubber with high elongation and low compression set.

SE-405

COMP: Methyl vinyl-type reinforced silicone rubber gum.

SUP: General Electric Co. (Silicone Products Dept.).

PHY PROP: Low shrinkage. Color off-white to light straw. Sp. gr., 1.10.

PROC PROP: Excellent freshened life with reinforcing fillers.

VUL PROP: Compounds suitable for use from —80 to +500° F. Low compression set, very good heat aging and electrical properties.

SE-406

COMP: Methyl vinyl-type reinforced silicone rubber gum.

SUP: General Electric Co. (Silicone Products Dept.).

PHY PROP: Off-white color to light straw. Sp. gr., 1.10. Low shrinkage.

PROC PROP: For best reproducibility of properties, all compounds mixed from SE-406 can be shelf-aged at least overnight before further processing. Easier to work on mill not equipped with knife blade.

VUL PROP: General purpose, low shrinkage, high strength.

SE-452

COMP: Silicone rubber.

SUP: General Electric Co. (Silicone Products Dept.).

PHY PROP: White. Sp. gr., 1.17 after 1 hr./300° F.

PROC PROP: 50-durometer silicone rubber suggested as extrusion compound. Requires room-temperature plasticizing on a rubber mill prior to fabrication.

VUL PROP: Good tear resistance and excellent compression set properties. Designed for extruded seals and gaskets. General-purpose stock serviceable from —75 to 500° F. in vented systems.

SE-482

COMP: Silicone rubber.

SUP: General Electric Co. (Silicone Products Dept.).

PHY PROP: White, 80-durometer silicone rubber compound with sp. gr. of 1.21 after 24 hrs./480° F. cure.

PROC PROP: Suitable for fabrication by molding, calendering, and extrusion methods.

VUL PROP: Has good tear resistance and excellent compression set properties. For use in molded and extruded seals. General-purpose compound.

SE-505

COMP: Premium-grade methyl phenyl vinyl polysiloxane reinforced gum.

SUP: General Electric Co. (Silicone Products Dept.).

PHY PROP: Off-white to semi-transparent. Sp. gr., 1.12.

PROC PROP: Medium firm, very easily worked. Must be compounded and handled on clean equipment, like all silicone gums.

VUL PROP: Reinforced gum alone contains enough filler to make a 40-durometer compound. Contains no catalyst. Highest strength reinforced gum.

SE-555

COMP: Silicone rubber.

SUP: General Electric Co. (Silicone Products Dept.).

PHY PROP: Gray, 50-durometer compound. Sp. gr., 1.18 at 1/hr. 300° F.

PROC PROP: Easy processing, bonds immediately on mill, can be fabricated by all commonly used methods. Can be freshened excessively without becoming sticky and can be extruded several days after freshening.

VUL PROP: Highest-strength compound possessing excellent elongation and tear strength with moderate compression set. With excellent mechanical properties, low water absorption characteristics, and good oil resistance, suggested for molded and extruded seals and gaskets. Particularly recommended for parts supplied against AMS 3345.

SE-565

COMP: Silicone rubber.
SUP: General Electric Co. (Silicone Products Dept.).
PHY PROP: Grey compound. Sp. gr., 1.22.
PROC PROP: Similar to SE-555.
VUL PROP: High-strength, extreme low-temperature compound with good electrical properties, excellent tensile strength, elongation, and tear resistance. Used primarily as a jacket stock or specialty insulation, will meet MIL-R-5847, Class III, 60-durometer or AMS 3346.

SE-975 Series (SE-975, SE-9003, SE-9007)

COMP: Silicone rubber.
SUP: General Electric Co. (Silicone Products Dept.).
PHY PROP: A series of compounds which yield same excellent physical and electrical characteristics in the finished product, but which differ in processing characteristics. These variations in processing characteristics have been deliberately introduced to suit industry variations in processing equipment and differences in conductor size and wall thickness of products to be manufactured. White in color. Typical sp. gr., 1.20.
PROC PROP: Available in two forms, both for CV and other steam-curing techniques and hot-air curing. Compounds designed for former are designated by suffix "N" (i.e., SE-975N). Compounds designed for hot-air curing are designated by suffix "A."
VUL PROP: SE-975 compounds are suggested for wire and cable constructions to meet MIL-W-8777, MIL-W-16878, and MIL-C-19381 and all other applications requiring excellent electrical and physical properties. Typical applications include aircraft and missile wire, hook-up and lead wire and power cable.

SE-1010

COMP: Silicone rubber.
SUP: General Electric Co. (Silicone Products Dept.).
PHY PROP: Red, 50-60-durometer compound. Sp. gr., 1.17.
PROC PROP: Characterized by uniformity, long freshened after-life, and easy processability. Applied by calendering.
VUL PROP: Will produce non-blocking semi-cured tapes with excellent shelf life. Final cured tape structures show high peel strength, high heat resistance, and excellent electrical properties.

SE-3701

COMP: Silicone rubber.
SUP: General Electric Co. (Silicone Products Dept.).
PHY PROP: Off-white, medium firm. Sp. gr., 132 ±.05.
PROC PROP: Requires room-temperature plasticizing on a rubber mill prior to addition of curing agent. Material handles easily on a rubber mill and may be cross-blended by knife cutting.
VUL PROP: Good low compression set stock possessing good resistance to common lubricating oils. Hardness rating, 70.

SE-5004

COMP: Silicone rubber.
SUP: General Electric Co. (Silicone Products Dept.).
PHY PROP: A 50-durometer compound neutral in color. Sp. gr., 1.30. Soft.
PROC PROP: Easily milled, characterized by uniformity, long freshened life, and easy processability. Recommended for cloth coating by calendering.
VUL PROP: Extreme low-temperature compound.

SE-5301

COMP: Silicone rubber.
SUP: General Electric Co. (Silicone Products Dept.).
PHY PROP: 25-durometer silicone rubber compound White in color, medium hard. Sp. gr. 1.18.
PROC PROP: Very easily worked. Bonds immediately when put on a mill, can be fabricated by molding, extruding, and calendering.
VUL PROP: Extreme low temperature, suggested for molded and extruded seals, low-pressure gaskets, pads and cushions as well as other parts requiring low durometer.

SE-5504U

COMP: Silicone rubber.
SUP: General Electric Co. (Silicone Products Dept.).
PHY PROP: Gray, 40-durometer compound. Sp. gr., 1.18 ±0.5.
PROC PROP: Similar to SE-555.
VUL PROP: High-strength compound designed for shock mounts, rubber rolls, and bumper pads. Develops primerless bond to ferrous-containing metals stronger than the material itself (1500 psi.)

SE-5601

COMP: Silicone rubber.
SUP: General Electric Co. (Silicone Products Dept.).
PHY PROP: Red, 60-durometer compound. Sp. gr., 1.21.
PROC PROP: May be molded, calendered, or extruded.
VUL PROP: Designed for applications where good high-temperature compression set and extreme low-temperature flexibility are both desirable or necessary. When properly catalyzed and fabricated, meets mil spec MIL-R-5847C 60-durometer as well as AMS-3356.

SE-9008

COMP: Silicone rubber.
SUP: General Electric Co. (Silicone Products Dept.).
PHY PROP: Off-white in color. Sp. gr., 1.38. Designed to meet industry demand for a moderately priced compound yielding good physical and electrical properties.
PROC PROP: Processability excellent, featuring ease of milling, high extrusion speeds, excellent diameter control, and good braidability. Retains non-milling characteristics for a minimum of three months and can be used in any equipment capable of extruding conventional silicone rubber compounds without modification of the equipment or the use of special dies. Suggested for use as extruded insulation on power

cable, fixture wire, motor and apparatus lead wire, etc.

VUL PROP: Low-cost, medium-strength wire and cable compound. Useful range from —80 to 500° F.

Silastic 50

COMP: Silicone rubber.
SUP: Dow Corning Corp.
PHY PROP: Silicone rubber compound. Sp. gr., 1.22. Color, white.
PROC PROP: Suitable for molding, extruding, laminating, calendering, and wire covering. Can be blended with Silastics 52, 80, and 82 to adjust hardness. Easily colored with suitable pigments.
VUL PROP: General-purpose stock with good dielectric properties, low water absorption, and good compression set without addition of toxic additives.

Silastic 52

COMP: Silicone rubber.
SUP: Dow Corning Corp.
PHY PROP: Silicone rubber compound. Sp. gr., 1.15. Color, tan.
PROC PROP: It is neither sticky nor excessively dry and can be peeled from mill rolls without a scraper blade. Possesses good green strength. Can be fed into an extruder easily.
VUL PROP: It has good heat stability. A general-purpose stock serviceable from —70 to 500° F. Has excellent electrical properties. May be blended with Silastic 82 to adjust hardness.

Silastic 80

COMP: Silicone rubber.
SUP: Dow Corning Corp.
PHY PROP: Similar to Silastic 50, but compounded to cure to a durometer of 80. Sp. gr., 1.24. Color, white.
PROC PROP: It is suitable for molding, extruding, laminating, calendering, and wire covering. May be blended with Silastic 50 to adjust hardness. Can easily be colored with suitable pigments.
VUL PROP: It is a tough, high tensile strength, high elongation rubber serviceable from —70 to 500° F. Has good electrical properties, low water absorption, and good compression set resistance without toxic additives.

Silastic 82

COMP: Silicone rubber.
SUP: Dow Corning Corp.
PHY PROP: Similar to Silastic 52, but compounded to give a durometer of 80. Sp. gr., 1.24. Color, tan.
PROC PROP: It handles and processes well, being neither sticky nor excessively dry. Possesses good green strength and can be peeled from mill rolls without a scraper blade. Feeds into an extruder easily.
VUL PROP: It is heat stable. General-purpose stock with good electrical properties. Serviceable from —70 to 500° F. May be blended with Silastic 52 to adjust hardness.

Silastic 122

COMP: Silicone rubber.
SUP: Dow Corning Corp.
PHY PROP: A heavy-consistency paste. Sp. gr., 1.50. Color, grey.
PROC PROP: It can be applied as received, and cured to provide an effective space filler or seal for electrical and electronic units.
VUL PROP: It has good dielectric properties with high heat conductivity. Serviceable from —70 to 500° F. Used for coating or calking.

Silastic 125

COMP: Silicone rubber.
SUP: Dow Corning Corp.
PHY PROP: A low-consistency paste. Sp. gr., 1.55. Color, white.
PROC PROP: It is used for coating and calking, as received.
VUL PROP: Serviceable from —70 to 500° F. Can be used as a strand filler for electric cable.

Silastic 132

COMP: Silicone rubber.
SUP: Dow Corning Corp.
PHY PROP: Putty-like paste. Sp. gr., 1.3. Color, white.
PROC PROP: Generally applied from solvent dispersion. Readily dispersable in xylene; can easily be diluted to practically any desired concentration.
VUL PROP: Provides a flexible, resilient coating to organic fabrics serviceable from —70 to 500° F. with good resistance to abrasion and to a variety of chemicals and oils. Exhibits low water absorption and retains good dielectric properties even after aging at high temperatures and flexing.

Silastic 152

COMP: Silicone rubber.
SUP: Dow Corning Corp.
PHY PROP: Silicone rubber stock. Sp. gr., 1.22. Color, red.
PROC PROP: May be molded, extruded, sponged, laminated, or calendered.
VUL PROP: General-purpose stock cures to about 50 durometer and is serviceable from —70 to 500° F. Cures in a relatively short time to yield high tensile strength, good elongation and tear resistance.

Silastic 250

COMP: Silicone rubber.
SUP: Dow Corning Corp.
PHY PROP: Silicone rubber stock. Sp. gr., 1.19. Color, orange-tan.
PROC PROP: May be molded, extruded, calendered, or sponged. It is one of the most easily sponged Silastic stocks and produces uniform multipore structure.
VUL PROP: An extreme-temperature stock. Serviceable from —100 to 500° F.

(To be concluded)

This listing of synthetic rubbers (except SBR) has been running in installments which started in May. Upon completion of the series next month (October) the entire list will be available in reprint form. EDITOR.

Polybutadiene Papers Highlight Southern Rubber Group Meeting

Two papers which indicated that *cis*-polybutadiene can outwear and undersell natural rubber in truck tire treads highlighted the two-day meeting of the Southern Rubber Group, June 23 and 24, at the Buena Vista Hotel in Biloxi, Miss.

The papers, one by Paul W. Cornell, Goodrich-Gulf Chemicals, Inc., Cleveland, O., and the other by R. S. Hanmer and W. T. Cooper, Phillips Petroleum Co., Bartlesville, Okla., were part of a symposium on "Stereo Specific Polymers," held the morning of June 24. The other papers were given by N. R. Legge, synthetic rubber division, Shell Chemical Co., Torrance, Calif., on *cis*-polyisoprene, and by E. L. Borg, Naugatuck Chemical Division, United States Rubber Co., on ethylene-propylene rubber and *trans*-polyisoprene. J. D. D'Ianni, Goodyear Tire & Rubber Co., Akron, O., was moderator.

A symposium the afternoon of June 23 included papers by Arthur L. Hollis, R. T. Vanderbilt Co., Dallas, Tex., on antioxidants; by A. S. Krivitsky, Naugatuck Chemical, on antiozonants; by Frank Wilcox, Witco Chemical Co., Akron, O., on waxes; and by Guy Newton, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., on use of the outdoor Du Pont flex test. Harold Thenhaus, Gates Rubber Co., was moderator.

A film by Texas Alkyd Co. on the safe handling of alkyd-activated materials used in manufacture of stereo rubbers, was shown prior to the June 24 symposium. Ross Whitmore, as program chairman, arranged the symposia.

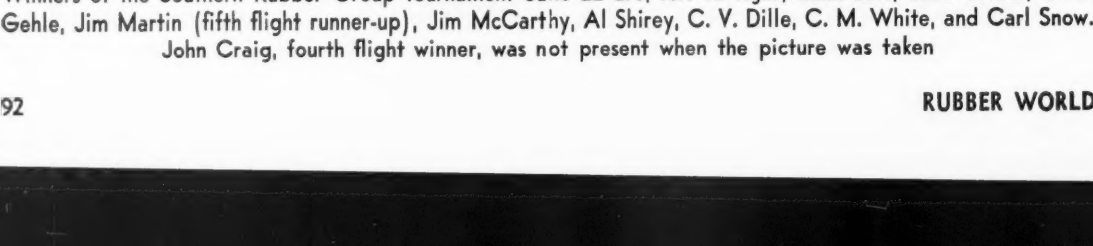
Polybutadiene Symposium

Dr. Hanmer's paper indicated that in blends of 60% *cis*-polybutadiene and 40% natural rubber, the ability of Cis-4 (Phillips' polybutadiene) to be heavily loaded with blacks and oils gives the blend a definite cost advantage over natural rubber. At 45 phr. of ISAF black and five parts of oil, the blend is equivalent in cost to natural rubber at 30¢ a pound, Dr. Hanmer said. At 60 parts of ISAF and 20 parts of oil, the cost is equivalent to natural rubber at about 25¢ a pound, and at 70 parts of ISAF and 30 parts of oil it is equivalent to natural rubber at 22¢ a pound, he added.

Since a blend of 60% Cis-4 and 40% natural rubber has higher abrasion resistance than natural rubber alone, the cost per mile for the blend is even more favorable than the cost per pound. On that basis a blend with 45 parts of ISAF and five parts of oil is equivalent to natural rubber, with the same loading, at 22¢ a pound. At a loading of 60 parts of ISAF, the Cis-4 is equivalent to natural rubber at 12¢ a pound, and at 70 parts of ISAF, it is equivalent to natural rubber at 9¢ a pound.

Dr. Hanmer noted that factory tire tests showed increased abrasion resistance as the amount of Cis-4 rubber in the blends was increased and as the amount of ISAF black was increased. A 60/40 blend of Cis-4 and natural rubber with 60 parts of ISAF black and 18 phr. oil gave an abrasion index of 143% compared with natural rubber. When 70 phr. of HAF black and 22 phr. oil were used, a 60/40 blend had an abrasion index of 146%, and 80/20 blend an index of 150%, and an all Cis-4 stock an index of 161%, compared with natural rubber.

The speaker also declared that increasing the ratio of Cis-4 to natural rubber gave increases in compounded Mooney viscosity, and extrusion rate, with a sharp decrease in 300% modulus, decreases in tensile strength and elongation, a slight increase in heat buildup, and an increase in resilience. Extension gave little change in modulus and tensile strength for Cis-4, but sharp decreases for natural rubber. Heat buildup increased and resilience decreased for both. Dr. Hanmer said that



Winners of the Southern Rubber Group tournament June 22 are, *left to right*, John Bolt, Jack Owens, C. E. Gehle, Jim Martin (fifth flight runner-up), Jim McCarthy, Al Shirey, C. V. Dille, C. M. White, and Carl Snow. John Craig, fourth flight winner, was not present when the picture was taken

the lower modulus of Cis-4 may reduce heat generation in actual tire service.

Cornell stated that through use of a cobalt Ziegler catalyst, a *cis*-polybutadiene can be polymerized which has a *cis* content higher than 98%. Other catalysts such as lithium alkyls and titanium produce polybutadienes with lower *cis* contents.

He explained that the cobalt-catalyzed polybutadiene, Goodrich-Gulf Chemical Co.'s Ameripol-CB, can be used without blending with natural rubber. Pigmented *cis*-polybutadiene has outstanding abrasion resistance, obtaining about 65% more mileage for the same amount of wear in heavy-duty tire treads as natural-rubber tread stocks. Even in a 50-50 blend it will give 25% improvement in tread wear, he said. He noted, as had Dr. Hanmer, that the increased tread wear was even more apparent under conditions of great severity. Under the most severe conditions Ameripol CB will outperform natural rubber tread stocks by 5 to 1, he added. On the other hand, under conditions of little severity natural rubber performs better. The 65% improvement is for average conditions under which truck tires perform.

The speaker explained that Ameripol CB stock will have less nerve, hold gage more consistently, and be less porous than natural rubber stocks.

Cornell said that the properties of Ameripol CB are improved by a procedure called "preprocessing," in which certain non-rubber materials are incorporated in the rubber in a precise manner. Neither the materials nor the procedure was identified.

This process, he said, gives a polymer which tests at 30 Mooney viscosity, but has a resistance to cold flow equal to a 50 Mooney cold SBR. The trend in the future may be to use tougher rubbers with the preprocessing to achieve very high performance. He also declared that Ameripol CB can be oil extended, and that as a means of reducing product costs such oil extension is likely in the future.

He added that although the immediate application for Ameripol CB seems to be in truck-tire treads, its high abrasion resistance may make it attractive for passenger tires, particularly in the premium grades.

Borg discussed briefly the subject of ethylene-propylene rubber, which, he pointed out, is not a stereo-specific polymer since the stereo-specific polymers, polypropylene and polyethylene, are crystalline, and therefore a rubber is made by a random linkage of the two monomers on the polymer chain, similar to SBR. Like the stereo-specific polymers, however, ethylene-propylene rubber is polymerized with a Ziegler catalyst in a solvent system, he noted. The speaker discussed proportions of ethylene and propylene used in the copolymer to achieve desired characteristics. He also described briefly *trans*-polyisoprene, which Naugatuck is developing for golf balls and similar uses.

Mississippi State senior R. F. Ellis is the 1961-62 recipient of the SRG Harmon Connell Memorial Scholarship

Dr. Legge discussed latest developments in *cis*-polyisoprene, including data on polyisoprene latex.

Protective Materials Symposium

In the earlier symposium on antioxidants, antiozonants, and waxes, Newton discussed Du Pont's flex tester, which, he said, combines natural ozone and weather conditions with flexing in compression and extension, and thus gives results in a week's time, compared with a minimum of 60 days for outdoor weather tests alone.

The test has the advantage that it incorporates flexing, weathering, and natural ozone, all conditions found in outdoor dynamic applications, and in that polymer differences or variations in curing conditions do not affect the ranking of the antioxidant or antiozonant, he said. In addition, the tester will easily incorporate a large number of samples which are not difficult to prepare, he added.

The tester holds three belts, giving a total of 63 sample spots, and Du Pont finds it desirable to run at least two of each sample on each of the three belts. Each belt flexes 380 cycles per minute, with a belt tension of 17 pounds, traveling through three extensions and one compression phase. In order to get maximum daylight exposure without the special attention of a technician, the flexing machine is operated by use of an electric eye. The machine, operated on the roof of Du Pont's Akron laboratory, uses a backed sample.

Hollis discussed the chemistry of rubber degradations and the mechanisms by which antioxidants delay these degradations. The four possibilities, he said, are destruction of peroxy radicals and hydroperoxide by donations of hydrogen, addition of the peroxy radical to the aromatic ring with loss of hydrogen, deactivation of metal impurities which would catalyze oxidation, and direct attack by oxygen on the antioxidant. The precise mechanisms are not fully understood, he declared.

This speaker noted that the mechanisms of degradations in the stereo-specific rubbers are different from those encountered in natural rubber and butadiene-based rubbers.

Hollis said further that the amine antioxidants are useful under severe service conditions where some staining can be tolerated. Where staining is not desirable, the hindered phenols are used, but these possess low activity compared with the nitrogen compounds and will not protect vulcanizates under severe service conditions. A non-discoloring antioxidant is also obtained with hydroquinone when one of the hydroxyl groups is subsituted or steric hindrance is introduced.

Wilcox discussed the use of waxes for protection against weathering, noting that they are generally not so good as an antiozonant under severe dynamic conditions, but more effective against static weathering than antioxidants, and therefore have a major role in automotive and mechanical goods where static weathering is a major concern. This point is true because of low price, freedom from stain, and durability, he explained. He also noted that a small amount of wax improves the sunlight resistance of an antiozonant in tires.

Krivitsky dealt with the chemistry and uses of antiozonants, noting that the protection afforded rubber by antiozonants is a surface phenomenon, and that the mechanism of ozone attack is thought to be the reaction of ozone with rubber double bonds. He pointed out that ozone attack is becoming a more important factor in the United States every year, as the amount of ozone in the air in the major cities increases year by year. It is thought that this ozone concentration is caused by the presence of hydrocarbons, particularly from motor vehicles. The general concentration of ozone in air is between none and six parts per hundred million of air, but in Los Angeles the concentration is 25 parts per hundred million, he said.

Social Sessions Successful

Approximately 225 members and guests were registered for the two-day session, bringing with them an estimated 100 wives and 85 children. Approximately 300 were present at the banquet the night of June 23, with Max Petty, of Petty, Hundemer & Associates, New Orleans, La., as speaker, and Victor Boettchel, Shell Oil Co., as master of ceremonies.

New officers of the Group, elected by a mail ballot, are Roswell C. Whitmore, Better Monkey Grip Co., chairman; John R. Galloway, Du Pont, vice

New officers of the Southern Rubber Group are, *front row, left to right,* R. C. Whitmore, chairman; J. R. Galloway, vice chairman; Allen Craig, treasurer; and R. W. Rice, secretary. Directors, *back row, left to right,* are J. M. Schneider, C. P. McKenna, D. A. Reneau, and Monroe Mirsky

chairman; Allan B. Craig, Jr., Witco Chemical, treasurer; and J. M. Schneider, Xylos Rubber Co.; and Monroe Mirsky, Wyatt Industries, directors. R. W. Rice, Firestone Tire & Rubber Co., remains as secretary, and C. P. McKenna, Vector Mfg. Co., and D. A. Reneau, United Carbon Co., as directors.

At the business session, presided over by Lenoir Black, C. P. Hall Co., retiring chairman, Martin Samuels, Copolymer Corp., retiring treasurer, reported more than $3,000 in the treasury, and John Galloway, membership chairman, reported a high of 575 paid members.

Connell Scholarship Award

J. P. McKenzie, chairman of the education committee of the Southern Rubber Group, reported that Robert F. Ellis, a senior at Mississippi State University, is the 1961-62 recipient of the Harmon Connell Memorial Scholarship, first given by the Group in 1957. The award honors the first chairman of the Southern Rubber Group.

Golf Tournament Results

Approximately 75 members participated in the golf tournament, June 22, at the Gulf Hills Dude Ranch, Biloxi. Winners were: Carl Snow, United Carbon, championship flight; C. M. White, Cabot Corp., first flight; C. V. Dille, C. P. Hall, second flight; Al Shirey, Ludlow Plastics Co., third flight; John Craig, Nopco Chemical Co., fourth flight; Jim McCarthy, U. S. Rubber Reclaiming Co., fifth flight; G. E. Gehle, A. Schrader Sons Co., sixth flight; Jack Owens, Raybestos Manhattan, Inc., seventh flight; John Bolt, Naugatuck Chemical, eighth flight. Runners-up included Jim Schneider, Xylos Rubber; Mike Gobush, Monsanto Chemical Co.; John Morrow, Sun Oil; Wheeler Bearden, J. M. Huber Corp.; Jim Martin, Textile Paper Products Co.; Jerry Bullock, Glidden Co.; Bob Camp, Goodyear Tire & Rubber Co., and Richard Golden, Sun Oil Co.

High gross went to William J. Williams, Neville Chemical Co.; the poker hand to J. Korose, Newport Industries; and the blind bogie to Jim Pettit, Textile Paper. L. W. McCallum, Huber, chairman of the tournament, won the hole-in-one contest.

AIEE Meeting Includes Butyl Rubber Symposium

The second technical symposium on butyl rubber wire and cable insulations is scheduled for October 20 in Detroit, Mich., as part of the fall general meeting of the American Institute of Electrical Engineers.

R. E. Hoy (Enjay Chemical Co.), chairman of the seminar planning group, has issued an agenda of seven papers covering the theme of the symposium — "utilization, experience, and current developments of butyl insulation."

Highlights of the meeting will include a report on the nationwide survey for field experience with butyl insulations, progress in the manufacture of improved and higher-voltage butyl insulation since 1955, case histories of special installations, and reports and general discussion.

The following papers will be presented: "Electrical Characteristics of Butyl Rubber Insulations at 125° C.", by N. D. Kenney, T. N. Metropolus, W. L. Seamonds (Simplex Wire & Cable Co.); "Continued Evaluation of Butyl Rubber Insulated Cables," J. R. Maher, J. C. Carroll (General Electric Co.); "Some Factors in the Short-Time Dielectric Strength of Butyl Rubber Insulated Cables," W. A. Beasley (Anaconda Wire & Cable Co.); "Butyl Rubber Network Cables for 260° C. Limiter Operations," R. H. Carlson (American Steel & Wire Co.); "Development of Butyl Rubber Insulated Buried Airport Lighting Cables," R. C. Graham, S. R. Lynch (Rome Cable Co.); "Design and Manufacture of Butyl Rubber Insulated Dredge Cables," P. Gibbon, J. Campbell (Northern Electric Co.); "Survey of Utility and Industrial Users of Butyl Rubber Insulated Cables," by D. Cronin (Ebasco Services, Inc.), E. Johnson (Philadelphia Electric Co.), R. E. Hoy.

NYRG Golf Outing

The New York Rubber Group golf outing was held August 10 at Scotch Plains Country Club and Echo Lake Country Club, Westfield, N. J. This was the first time the Group used two courses in order to accommodate more adequately the large number of golfers. Under almost ideal conditions 229 golfers divided between the two courses to test their skills and compete for prizes. Dinner was enjoyed by 257 members and guests at Scotch Plains Country Club, after which prizes were awarded to the deserving.

Cochairmen, A. H. Woodward (Du Pont) and W. R. Hartmann (Laurie Rubber Reclaiming), of the committee were ably assisted by K. E. Chester (C. P. Hall), M. A. Durakis (General Cable), T. J. Farley (Vanderbilt), P. H. Wilhelm (United Carbon), and R. S. Walker (RUBBER WORLD).

The Nesbitt Cup, for member low gross, was awarded to W. Curtis (Naugatuck), who was tied at 75 with R. Stimets (United Carbon) after a match of cards. Since this win was the third for Curtis, the cup will be engraved with his name and retired from competition. H. Pryor (R. E. Carroll, Inc.) was third with a 76. Guest low gross winners, in order, were J. Oates, A. Lefelar (Clifton Adhesive), and C. Basilone. At Echo Lake, H. Smith and P. Kwiatanowski (Johns-Manville) were closest to the pin, and W. Curtis and R. Stimets had the longest drives. At Scotch Plains, E. Sutton (British Anchor Chemical Corp.) and A. Puschin (Kenrich Petrochemical) were closest to the pin, and R. Snedeker and R. Finn had the longest drives. The putting contest at Scotch Plains ended in a tie between R. Graff (Du Pont) and A. Puschin; an eagle was made by R. Finn, and high gross was achieved by W. Bull (ASRC).

Canadian Rubber Division Features "Textiles for Rubber" Symposium

The position of textiles as applied to the rubber industry was spelled out in great detail in a symposium of four papers on the subject at the recent meeting of the Canadian Division of Rubber Chemistry. This afternoon technical session was a main feature of the meeting held on August 4, the final day of the three-day annual conference of the parent Chemical Institute of Canada. These meetings were part of a series of international and Canadian Society conferences which made Montreal the temporary chemical capital of the world during late July and early August.

The morning technical session included papers on improving ozone resistance of nitrile rubber, some information on *cis*-polybutadiene, the use of lignin as a reinforcing pigment in tire compounds, and a review of the past and current status of tire vulcanization methods. A luncheon address by M. F. Anderson, president, Dominion Rubber Co., Ltd., completed the day's activities. (Official author abstracts of these papers will be found in RUBBER WORLD, July, 1961, page 96.)

The outstanding paper of the morning session was delivered by E. W. Madge, research manager, Dunlop Research Center, England, and was titled simply, "*Cis*-Polybutadiene." In the opinion of many of the people present, Mr. Madge did an excellent job of presenting many of the unusual properties of this material with some very fine background into theories or test data to help explain how these properties may be used in rubber products.

The lead paper of the morning, given by W. J. Abrams, Polymer Corp., Ltd., gave information on "Improving the Ozone Resistance of Nitrile Rubber." Mr. Abrams spoke on the use of poly(vinyl chloride) to gain this improved resistance. While this concept is not unknown to many in the rubber industry, the data and rather good pictures on the use of a special mandrel exposure test which provides progressively increasing stress to the sample added much new information. While the speaker confirmed the basic idea of better resistance of the NBR/PVC blends, his paper went into detail on the selection of resin and on the various ratios possible and the effect these variables have on ozone resistance. It appears that it is not sufficient just to take an NBR/PVC blend and assume that an optimum compound for exposure to ozone has been prepared. The proper resin, the proper ratio of rubber to resin, and the method of preparing the blend must all be taken into account.

A further report on the program to utilize "Lignin as a Reinforcement for SBR in Military Pattern Tires" was given by T. R. Griffith, National Research Council, Ottawa. Co-authors of this paper were D. W. MacGregor, Bauer Bros., Brantford, Ont., and Lloyd Krichew, Army Development Establishment, Ottawa. This paper covered the latest work in the program which has been going on for some time under the sponsorship of the Canadian Army with the cooperation of other Canadian Government agencies and Canadian industry. Basically this project seeks to utilize this common material (lignin) as a replacement for carbon black to provide an emergency material in the event of shortages. At this time it would appear that some headway has been made and that some tires and compounds have proved to show promise, according to the authors. There are, however, still many bugs to be worked out before complete success can be claimed.

The final paper of the morning concerned "Progress in Pneumatic Tire Vulcanization" and was delivered by G. D. Stevens, Goodyear Tire & Rubber Co. of Canada, Ltd. A review of past milestones in tire vulcanization was included; then the author went into some of the facets of modern practice. Emphasis of latter portions of the talk went into the control accuracy and reliability needed in today's high-temperature, short-cycle curing which is necessary for efficient production of the many sizes and types of tires needed to satisfy the market.

The four speakers in the special afternoon session on textiles covered the present positions of cotton, rayon, nylon, and Terylene. Amid a certain amount of good natured barbs aimed by each speaker against the other products, the best features of each fiber and some of the reasons for its use along with its general properties were presented. As each story unfolded, it was fairly clear to the audience that a balance between properties offered by each fiber weighed against the intended use is a major consideration, but in the final analysis it boils down to which material can supply the necessary properties at lowest cost. This requirement often leads to blends of the several types offered. Cotton, while admittedly very limited in tire use, was shown to have many uses in the rubber industry still and is far from being completely out of the picture.

The case for nylon was presented by A. R. Szewczyk, Du Pont of Canada; the cotton story by D. James, Cosmos Imperial Mills, Ltd.; the position of Terylene by John Little, Canadian Industries, Ltd.; and the status of rayon, by Mark Abbott, Courtaulds Canada, Ltd.

In his luncheon address, Mr. Anderson said he was very glad to be back among old friends and made a plea for the utmost efforts on the part of rubber technologists to continue the progress he outlined in his talk, "Modern Trends in the Rubber Industry."

In spite of the meeting being held in the midst of the holiday season in Canada, a representative group of more than a hundred Canadian rubber chemists and guests enjoyed the day, described by A. Jaychuk, Division chairman, as a very successful conference.

CRG Golf Outing

The annual golf outing of the Chicago Rubber Group was held July 21 at the St. Andrews Country Club. Despite two rain spells that lasted for several hours, about 300 members and guests played golf, and 460 attended dinner.

Members of the committee were: chairman, Yale Karmell (Sam'l Bingham's Sons Mfg.); assistant chairman, Al Marr (Judsen Rubber); and Ted Biell, Ed Gentry, Harold Stark (all of Dryden Rubber); Frank Smith, George Smith, Grant Sweet (all of Williams-Bowman Rubber); Phil Parratore, Russ Spielmen (both of Witco Chemical); Kermit Geiger (Sam'l Bingham's Sons); B. G. Hutchison (Copolymer Rubber); and Harold Shetler (Sirvene Division of Chicago Rawhide).

Low gross trophy winner was William Ford (Columbian Carbon) with a 76, followed by Charles Skuza (South Haven Rubber); Peoria handicap, Charles Mathews (Chicago Rawhide) and Edward Shortell (Farrel-Birmingham); nearest to pin, Gregory Davila (Servicised Products); putting, Jack Leeds (Richardson Co.) and D. Farynyk (Phillips Chemical); high gross, R. Williams (W. S. Holmes); and most putts, Stephen Weisskoff (Enjay Chemical).

Conn., Phila., N. Y. Plan Joint Meeting

Members of the Philadelphia and Connecticut Rubber groups will join with host New York Rubber Group for a joint meeting on October 20 at the Henry Hudson Hotel in New York, N. Y.

This get-together meeting is the result of efforts on the part of many members of all three groups over the past several years who felt that such a meeting would be of benefit.

This will, of course, be the regular meeting of the New York Group. For the Philadelphia contingent, this meeting will also take the place of the regular fall meeting and thus cancel the tentatively scheduled October 13 meeting. The Connecticut Group will, however, hold its scheduled meeting on November 17 since it is "sports night," and election of officers will take place.

A special selection of technical papers is planned by the committee.

D-24 Reports Unfavorable Results On Black Nomenclature Proposals

The ASTM Committee D-24 meeting held August 9 in Atlantic City, N. J., reported generally unfavorable reaction in response to a questionnaire regarding carbon black nomenclature proposals.

Results of the March, 1961, letter-ballot gave approval to specifications for carbon blacks used in rubber products, D 1765-60T, revised modulus limits for GPF black and proposed tentative method for sampling bulk shipments of carbon black.

Approval of subcommittee reports authorizes joint letter-ballots on tentative methods for mass strength of pelleted carbon black and revision of tentative specifications D 1765 to include proposed heating loss limits for carbon black.

Subcommittee 1—Physical Testing. J. F. Svetlik, Phillips Chemical Co., chairman. The mass pellet strength test was discussed, and results were presented to show the reproducibility of test results with an air-actuated mass pellet strength tester. Some deviations in results were observed, and it was questioned if this-type mechanism offers better duplicability than the manually operated apparatus. A statistical analysis of the data will be made.

The test method for mass pellet strength will be written to incorporate the use of either a hydraulically or manually operated testing device. The test reliability (limit of reproducibility) will be shown. This method will be balloted in Committee D-24.

An inconsistency in identification was pointed out in ASTM D 1514-60T, "Tentative Method of Test for Sieve Residue from Carbon Black." The term "Filter" in Figure 1 will be changed to "Strainer" to conform to the list of equipment in Figure 2, Item C.

Subcommittee 2—Chemical Tests. J. E. Smith, J. M. Huber Corp., acting chairman. The possibility of the need of a test for the structure of carbon black was discussed. Oil absorption was considered to be too inaccurate a test, and no interest was shown in it. J. Gifford, Witco Chemical Co., felt that rubber modulus was a test of structure. I. Drogin, United Carbon Co., Inc., felt that a questionnaire should be sent to the committee members on the need of a structure test. A question on the need of such a test showed no interest in developing a test for structure at this time, and a motion was made to drop the subject until sufficient interest is shown. One negative vote on the motion was withdrawn when it was stated that opportunity will be given for consideration of this subject in future meetings, and the motion was approved.

Subcommittee 4 — Nomenclature. J. H. Gifford, chairman. The questionnaire of June, 1961, submitted on nomenclature of carbon blacks resulted in unfavorable reaction in regard to the following proposals: (1) new proposed nomenclatures based on a number-letter code; (2) proposed adoption of a universal code system in place of consumer pigment codes; and (3) proposed nomenclature for new blacks, such as symbols HAFF, ISFF, and SAFF, for Neotex and Regal blacks.

A summary of comments on the new proposed nomenclature (1) follows:

Most consumers were opposed in that the system was not sufficiently descriptive adequately to classify blacks—no differentiation between Regal 300, Neotex 100, EPC and MPC, and LM-SRF and HM-SRF; prefer a broader call-out system with more properties suggested for better description or classification of blacks; complex, difficult to remember, confusing; no common designation for members of a similar type or "family", e.g., thermal, furnace, channel types; and no means of designating blacks by suppliers or plants for special consumer requirements or applications. Some approved it as a sound and logical approach and preferable to the present system.

The producers against the proposal said it was complicated, burdensome, confusing, and they preferred the old system; hard to identify present known blacks by unrelated code; code system intended for identification implies requirements regarding iodine number and modulus rather than reference to specification of properties in D 1765; and it offers little or no advantage unless adopted as a universal code system. Some producers favored it if the iodine number continues as a standard test since another method under development may replace I_2 number, and some questioned the accuracy of designations selected for blacks listed.

General-interest comments questioned the wisdom of replacing an established system although endorsing meaningful designations. In addition, D-24 is responsible to more than just the rubber industry; the proposed system is not responsive to paint, ink, and plastics and would require designations covering their relevant properties.

A summary of comments on the universal code (2) follows:

Most consumers were against the proposal in that it would offer no advantage to the consumer and would require major revision in all formulas, specifications, etc. at consumers' time and expense; possible conflict with codes and letters on other materials and interference with codes used many years by many companies; and something additional needed to designate certain suppliers for a special use when all suppliers approved for other uses. Some consumers were in favor, indicating, however, that it will take some time to get used to it, and others would like supplier/plants to be identified in code.

The producers strongly favored adoption, indicating a savings to them and ultimately to the consumer.

A summary on the nomenclatures proposed on the new Regal and Neotex blacks (3) indicates that consumers and producers were each split between the extension of the present letter system, and preference for the new number-letter nomenclature.

Subcommittee 5—Sampling. R. Treat, J. M. Huber, chairman. The chairman read a review of methods involving statistics by a member of Committee E-11 on quality control of materials of the Tentative Method for Sampling Packaged Shipments of Carbon Black, D 1799-60T. The Committee E-11 review objected to the reference to E-105 and E-122 on Note 2. D 1799-60T does not follow through on the requirements for random or probability sampling and selection of sample size. The reviewer indicated the choice of rewriting the D 1799 method to conform to statistical methods or omit the reference that the method D 1799 is based on E-105 and E-122. The committee moved and passed a proposal to remove Note 2 entirely from D 1799. This change also involves the removal of Section 2 (a). The proposal was amended to include a footnote at the end of D 1799 to indicate that statistical methods shall be used in cases of dispute between producer and consumer.

Letter-ballot results for Tentative Method for Sampling of Bulk Shipments of Carbon Black were 35 affirmative, one negative, and 16 not voting.

To resolve the negative vote, it was proposed and seconded that Note 3 be deleted from the tentative method for sampling bulk shipments of carbon black, and change Section 3 to read: "withdraw a minimum of one (1) gal. sample (Note 2) from each sample port. . . ."

A proposal was made and seconded to rewrite the recently approved Tentative Method for Sampling Bulk Shipments of Carbon Black to recognize the comments of committee E-11 as applied to ASTM D 1799 as also applying to this method. This involves removal of Note 2 and that portion of Section 2 beginning at the wording, "The sampling of bulk shipments of carbon blacks shall be based on probability or random sampling . . . " An amendment proposed adding a footnote at the end referring to statistical methods shall be used in cases of dispute.

Subcommittee 7—Specifications, J. H. Gifford, chairman. It was approved unanimously to submit the following moisture specifications to letter-ballot for incorporation in D 1765-60T.

	Loss, Heating D 1509 (Maximum)
MT-FT-SRF-GPF-HMF	1.0%
FEF	1.5%
FF	2.0%
HAF-ISAF	2.5%
Channel Black	3.0%

Because of differences in opinion, heat loss of SAF is being further investigated.

Data from several sources proves SBR 1500 recipe using MBTS is too sensitive to moisture content to consider for a carbon black test recipe. The use of MBTS plus Santocure 26 acceleration shows promise of being not sensitive to moisture content of carbon black and will be further investigated.

Revised specifications for GFP black were approved unanimously on the letter-ballot.

Tlargi Activities

Two recent events in the Tlargi program were the second annual technical conference and the 1961 outing in Las Vegas, Nev.

Technical Conference

The second annual Tlargi technical conference, with 134 paid registrants in attendance, was held at the Mayfair Hotel, Los Angeles, Calif., June 7 and 8. Discussion periods followed the delivery of each paper, well moderated by Ray Stringfield and Ed Partridge. A luncheon was held at the hotel June 7, prior to the meeting and was attended by members of the conference committee with the conference speakers as special guests.

Speakers for the conference were: L. O. Amberg, Hercules Powder Co.; B. W. Fuller, Du Pont; H. A. Pfisterer, Polymer Corp.; D. B. Braun, Union Carbide Corp.; E. B. Newton, B. F. Goodrich Co.; R. M. Cardillo, Enjay Laboratories; E. M. Dannenberg, Cabot Corp.; and W. A. Ladd, Ladd Research Industries.

At the conclusion of the second session on June 8, D. C. Maddy, chairman of the technical conference, presented each of the guest speakers with a certificate in appreciation of his presence and presentation.

Las Vegas Outing

Two hundred twenty-eight Tlargi members participated in the 1961 outing at Las Vegas. Forty-four members played golf; while the remainder relaxed and enjoyed the many activities in the area.

Tlargi Courses

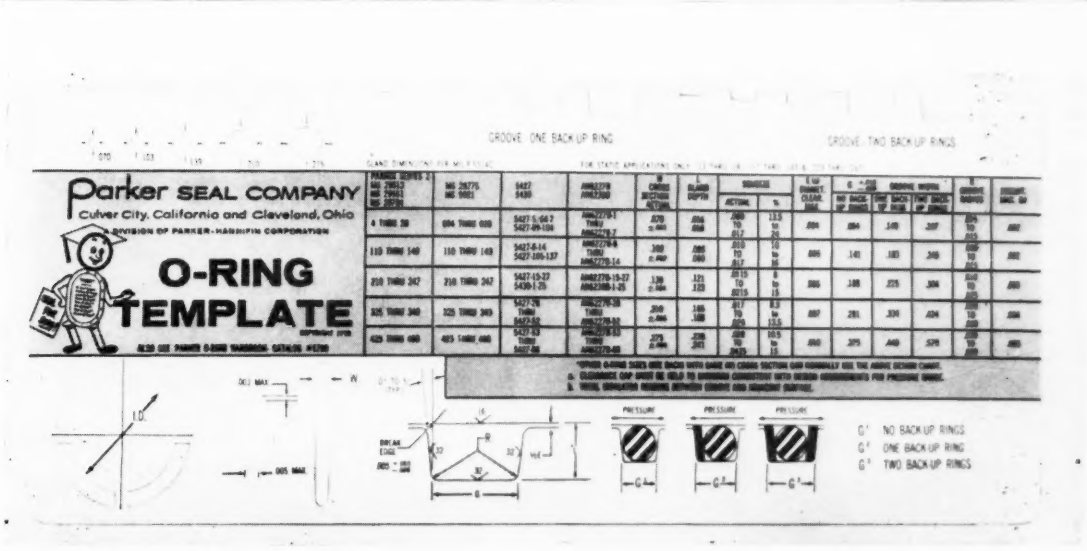
The Tlargi Rubber Technology Foundation, sponsored by The Los Angeles Rubber Group, Inc., and the University of Southern California, will again sponsor courses in rubber technology during the fall semester at the University. Descriptions of the courses currently being offered are listed below. Further information may be obtained from Dr. E. G. Partridge at the University of Southern California.

Chem. Engr. 442—Rubber Technology 1 (2 units credit). A lecture course on technology of natural and synthetic rubber including their chemistry, structure, production, testing, compounding, processing, and uses. Includes plant trips through several of the rubber producing and consuming industries in Los Angeles. Prerequisite: Elementary Organic Chemistry.

Chem. Engr. 015a—Basic Rubber Technology (non-credit). The first of two semesters, this is a practical course offering an introduction to the technology, compounding, and production of rubber, through plant visits and demonstrations. It covers types of natural and synthetic rubber, materials, equipment, design of finished products, and the testing and inspection of rubber.

Chem. Engr. 443aL—Rubber Technology Laboratory I (2 units credit). First of two semesters. Unit operations of the rubber industry, including compounding, mixing, extruding, curing, preparation of test samples, testing. Theory and practice of testing methods for natural and synthetic rubbers. Prerequisite: Elementary Physics.

Chem. Engr. 456—Technology of Specialty Elastomers (2 units credit). Chemistry, structure, manufacturing, processing, properties, and applications of fluoroelastomers, silicones, butyl rubber, neoprene, nitrile, "Hypalon" elastomer, Thiokol rubber, polyurethanes, and stereo-specific rubbers, polyisoprene and polybutadiene. Lectures, laboratory demonstrations, and a plant visit are included. Prerequisite: Chem. Eng. 442 or equivalent.



Parker Seal Co., Los Angeles, Calif., has developed a drafting template to aid engineers, designers, and draftsmen in drawing the cross-section pattern of O-rings and grooves. The semi-opaque plastic template also has dimensional and technical information printed on both faces

washington report

By JOHN F. KING

ICC Regulations on "Piggybacking" May Affect the Sales of Truck Tires

On June 19 the Interstate Commerce Commission handed down decisions in eight "landmark" cases involving the rates charged for moving freight under the hotly contested "TOFC" plan. TOFC, or truck trailers on railroad flat cars, is more popularly known as "Piggybacking."

The lawyers are still in a raging argument about ICC's decisions—some hail it as the last chance to rebuild America's sick transportation industry, others damn it as the one certain way to speed the demise of transportation in this country. Those taking this latter point of view leave no doubt that they will fight the ICC all the way to the Supreme Court to overturn the regulatory agency's decision.

What the argument is all about involves some highly complex and technical rule-making by ICC, but most traffic experts, after a hot summer of studying the decisions, agree that ICC has created for piggybacking a tremendous breakthrough into new and wider fields. As briefly stated as possible, ICC has put piggybacking on the road up to a dominant position in the transport network of this country. Heretofore, piggybacking of a loaded highway trailer on a railroad flatcar for movement over extra-long distances has been hampered in its development since introduction in the early 1950's by a jungle of legal restrictions maintained for the mutual protection of the two other main competing modes of transport—railroads and the trucking industry. The TOFC blend of the two modes has been a threat to each constituent part.

What does all this mean for the rubber industry? At first glance not much, but considered more carefully, and throwing in a great deal of speculation about the future, an acceleration of the trend toward piggybacking—which is what ICC's June 19 rulings foretell—could mean plenty. And some government experts who still have time for idle speculation muse that truck tire production in this country stands to feel the first pinch of an explosive development of the TOFC mode of transport.

"Consider this," says one muser. "The rubber industry produces 100 million automobile tires and 15 million truck tires a year. Yet because they are more costly to make, truck and bus tires make up more than a third of sales of tires in this country each year."

Thumbing through the 1958 Census of Manufactures, he produced these figures: while truck/bus tire shipments in the U. S. that year were under 13 million units, compared to nearly 85 million auto tires, their value was $602 million, compared with $1.0 billion for auto tires.

Coupled with the possibility that more trucks will move on rails—i.e., on steel and not rubber—as a result of ICC's piggybacking decision is the fact that—because truck tires are nowadays of such improved quality they can be recapped and recapped again and again—the prospect dims that demand for truck tires in the years ahead will continue to rise as rapidly as in the past. New processes featuring the use of nylon cords, steel-shielding, and so on have produced this technological change; TOFC will produce similar changes in traffic patterns that presage a reduced need of truck tires.

This, anyway, is what speculation on a warm summer day produces within the government.

Foreign Aid Impact On Domestic Orders

Now that it's that time of year to sell Congress on the idea of approving a foreign aid bill, the Administration has pulled together the figures showing once again that foreign aid is good for you. As it occasionally has in the past, the executive branch—intent on persuading all and sundry (but especially Congressmen who are reluctant to vote for another round of foreign aid) that economic assistance to other countries means fat order books for U. S. businesses—has catalogued the dollar amount of funds which have been channeled to United States firms supplying the goods which go into the aid program.

The rubber companies received a respectable share.

Starting with a state breakdown, showing what each of the 50 states received in "non-project" or soft-goods orders, the 187-page brochure from the International Cooperation Administration, describing very simply who received what reports that $319 million worth of direct orders to U. S. business was committed in fiscal 1960. Taking the period from 1954 to mid-1960, the total was more than 10 times as much—nearly $3.8 billion. New York got the lion's share, with $198 million in fiscal 1960 and $2.1 billion in the 1954-60 period; next was Texas with $37 million and $451 million, respectively; then California with $16 and $229 million. Ohio, headquarters for much of the rubber industry, received orders totaling $6.2 million in the fiscal year 1960 and $70 million over the 1954-60 period.

In fiscal 1960, Goodyear International received orders of $426,200, Firestone, $364,600; General, $272,500; Seiberling, $173,400; and Goodrich $24,400. U. S. Rubber got $443,000. This may not sound like much, but all the companies with headquarters in Detroit together received only a shade over $1 million. Continental Grain in New York was first single company with $22 million.

Meantime, ICA's office of Industrial Resources issued a report on another aspect of the foreign aid program—how the U. S. Government is helping other countries to become self-sufficient in light industry and thus reduce their

"35% more mileage"

with AMERIPOL® Micro-Black 4758

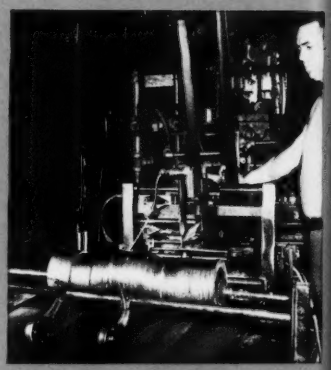
reports McCreary Tire & Rubber Company.

The goal was clear-cut—to dramatically improve the wear quality of the first line and premium tread rubber made by McCreary Tire & Rubber Company, Indiana, Pennsylvania. The recommendation made by the Goodrich-Gulf sales engineer—"Try the new AMERIPOL Micro-Black 4758." The results—an average improvement of 35% in tire tread wear . . . proven in actual fleet use. In addition, tires are quieter, stronger, and have better shock absorbing properties.

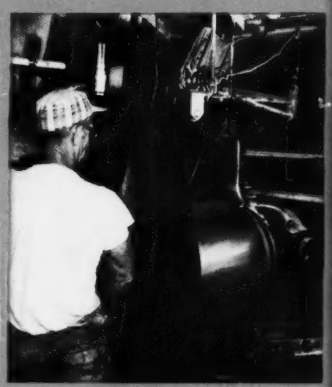
AMERIPOL MICRO-DISPERSION. The secret of the outstanding performance of AMERIPOL black masterbatch is jet-stream mixing of carbon black in the latex. This produces a superior dispersion, which greatly improves tensile strength and wear resistance. Investigate AMERIPOL Micro-Black for tires, tread rubber, shoes, coated fabrics or other black rubber products. You'll realize improved product quality, as well as materials and production savings. Call Goodrich-Gulf Chemicals, Inc., 1717 East Ninth Street, Cleveland 14, Ohio.

Goodrich-Gulf Chemicals, Inc.

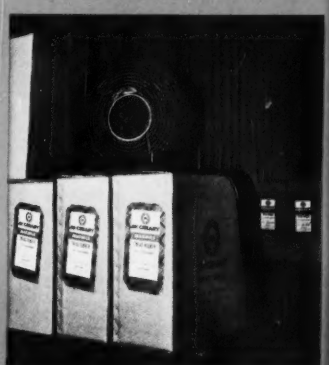
WORLD'S LARGEST SOURCE OF SYNTHETIC RUBBER



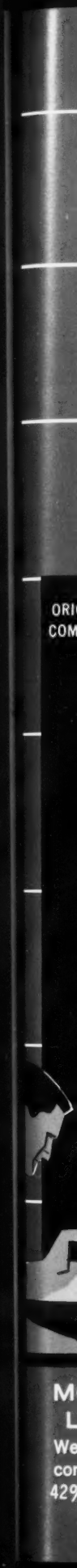
EASIER PROCESSING—AMERIPOL 4758 processes very well and is easier to handle on the production line. Mill time is reduced.



FASTER PRODUCTION—Extra weighing and milling operations are not needed for carbon black. As a result, McCreary has reduced labor costs.



BETTER PRODUCT—McCreary's tread rubber customers report improved workability and product appearance—and longer tread wear is a powerful sales tool for the retreader.



MORE WEAR IN LABORATORY

Wear of previous tread compound exceeded by 42% with AMERIPOL 4758.

MORE WEAR IN TAXI FLEET

Tests on taxicab fleet in Pittsburgh demonstrated superior wear in actual use.

MORE WEAR IN PASSENGER CARS

Tests under severe road conditions by automobile fleet in Odessa, Texas, further proved AMERIPOL performance.

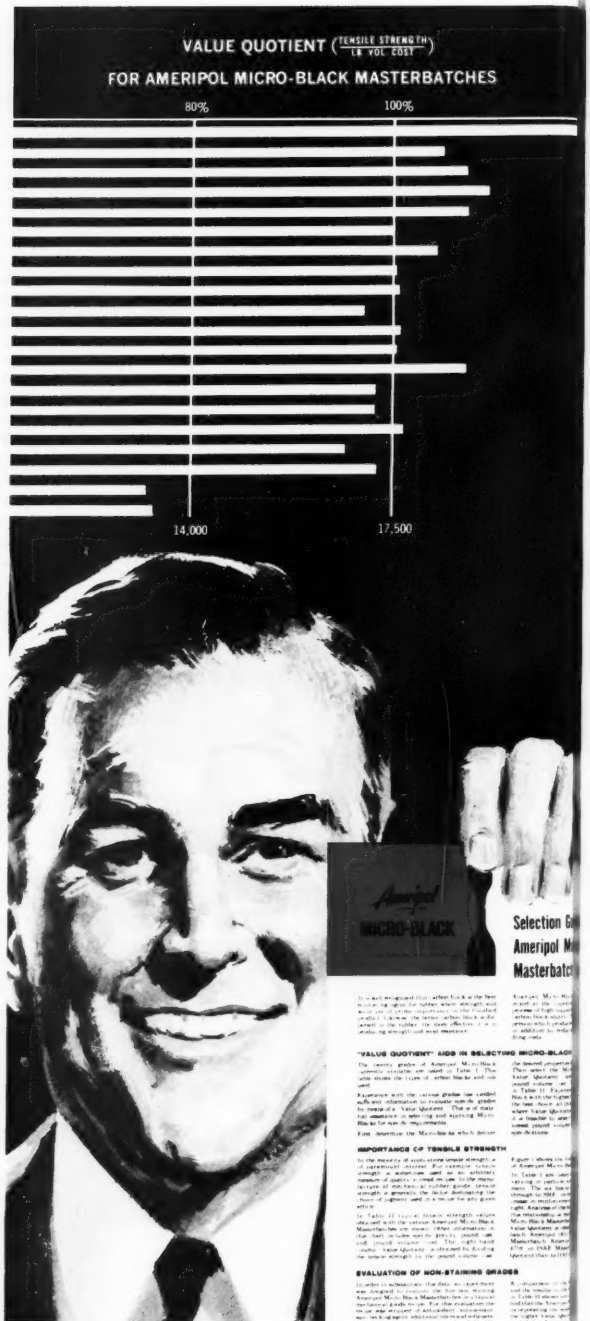
NOW... 20 MICRO-BLACK MASTERBATCHES OFFER A WIDE SELECTION OF PROPERTIES

With twenty grades of Ameripol Micro-Black now available, you can precisely select the combination of properties and costs that meet your requirements. And experience with the various grades have yielded enough data to provide an accurate selection guide.

A new bulletin "Selection Guide to Ameripol Micro-Black Masterbatches" gives complete data and lists "Value Quotients" for the various grades.

A chart contained in this Selection Guide plots various tensile strengths (often a matter of prime interest) and pound volume cost. Use of the "Value Quotient" gives you an easy method of evaluating and selecting the masterbatch you need.

For your copy, write Goodrich-Gulf Chemicals, Inc., 1717 East Ninth Street, Cleveland 14, Ohio.



Goodrich-Gulf Chemicals, Inc.

WORLD'S LARGEST SOURCE OF SYNTHETIC RUBBER

dependence on imports of costly soft goods such as rubber tires.

Discussing the U. S. aid program in Vietnam, ICA said that with U. S. assistance that Southeast Asian country is now producing its own rubber camelback—enough to recap 40,000 tires a year (See RUBBER WORLD, August, page 105). The plant, called Vietnam Cong-Thuong Cong-Ty, which was launched as a joint Vietnamese, American, and French venture, opened this spring. Using a patented process, the plant combines raw rubber and red clay obtained locally. The latter is used in place of carbon black to produce a product of quality equal to the strip previously imported." The factory will produce enough camelback for Vietnam's use, ICA said, adding that there may be enough surplus "to export to the Far East and South Asia."

Hose Imports Must Be Clearly Marked

Ths Customs Bureau has ruled that imported rubber hose must be more clearly marked to identify the country of origin. To become effective October 17, the ruling will require that identification of the country of origin must remain on the imported hose until it has reached the ultimate consumer.

At present, foreign hose arrives here on reels or in coils marked as to country of origin only at one end of the length of hose. Once this forward length has been cut off, identity of the country of origin of the remainder is lost, and the hose moves into commercial channels for all intents and purposes as hose which has been domestically produced.

After October 17, Customs said in July, the marking of the country of origin, in English, "shall be placed on the hose at intervals of approximately 10 feet by molding or vulcanizing it on to the hose while it is being manufactured or by some other equally permanent method so that the marking will remain legible and conspicuous until the hose reaches the ultimate purchaser in the United States."

BDSA Has Realignment; Names Douce to Staff

The Commerce Department has reshuffled its Business & Defense Services Administration "to improve the quality of its services to U. S. industry and trade and to strengthen the effectiveness of its industrial mobilization planning."

The merging of eight of BDSA's 25 industry divisions left intact the Chemical & Rubber Division as one of the 21 new offices serving various branches

W. C. Douce

of industry with statistical and technical information. Prior to the reshuffling, it was announced that William C. Douce, assistant manager of the rubber chemicals sales division of the Phillips Chemical Co., Bartlesville, Okla., had been named Assistant Director of BDSA's Chemical & Rubber Division.

Douce assumes the BDSA post under an arrangement whereby industry makes the services of key executives available for temporary duty, usually six months, without compensation from the government. The assignment also qualifies him for membership in the National Defense Executive Reserve, which would staff the operation of a production agency in event of national emergency.

Douce, 41, a chemical engineer, has been with Phillips since 1942. He has served in Phillips' rubber chemicals sales division as assistant chief since 1959.

The shakeup of BDSA's organization resulted in the creation of two new offices. The Office of Industrial Growth & Research will concern itself with broad technical, economic, and statistical studies of the effect of economic change. The other is the Office of Economic Programs, which will initiate studies of U. S. industry and business to measure its standing in relation to the world industrial balance of power.

SBA Report Issued On "Pattern Bargaining"

The Small Business Administration in August issued the results of a study of the effects of collective bargaining and wage settlements between labor unions and large companies in the rubber and the meat packing industry on smaller companies in the same industries.

The study finds that smaller firms in the industries get both advantages and disadvantages in "pattern bargaining" whereby contracts agreed to by large companies set the standard throughout the industry. The SBA management research summary sought to determine the extent to which patterns set by big unions and big companies spread to small firms in the rubber tire and meat packing industries. It also discusses how managers of smaller companies in these industries conduct collective bargaining and sets forth some suggestions on what course small businesses should follow when the "pattern" has been set.

A central conclusion of the survey is that labor agreements of the big companies on such items as wage boosts and fringe benefits are almost automatically accepted by smaller independent rubber producers and meat packers.

Entitled "Small Business and Pattern Bargaining," the summary is based on a study of 164 companies in the two industries by the Babson Institute of Business Administration on behalf of SBA. A four-page summary is available from SBA free, and copies of the full report may be purchased for $3.00 from Babson Institute Press, Babson Park 57, Mass.

FDA Grants Extension For Food Additives

The Food & Drug Administration has extended to January 1, 1963, the application of the 1958 Food Additives amendment to more than 200 elastomers and compounding materials which go into thousands of rubber products employed in the food and beverage industries. In extending the application date nearly 18 months, FDA said it will have to have a progress report from the rubber industry on the "safeness" of these rubber products by the first of next year.

The report will be prepared by The Rubber Manufacturers Association, Inc., special rubber committee on food additives. The materials listed Ausust 1 by FDA were itemized by the industry committee in its petition to the government last January to exempt from the provisions of the Food Additives amendment rubber products used by the food and beverage industry so long as they measured up standard extractability tests. The petition was supported by an exhaustive compilation of data on extraction and migration of rubber components in machinery used in food-handling equipment.

The industry has maintained that the safety of rubber products for food-handling purposes is proved by the conditions of intended use, the long history of safe use, the industry's carefully controlled manufacturing techniques, and the results of extensive tests and studies.

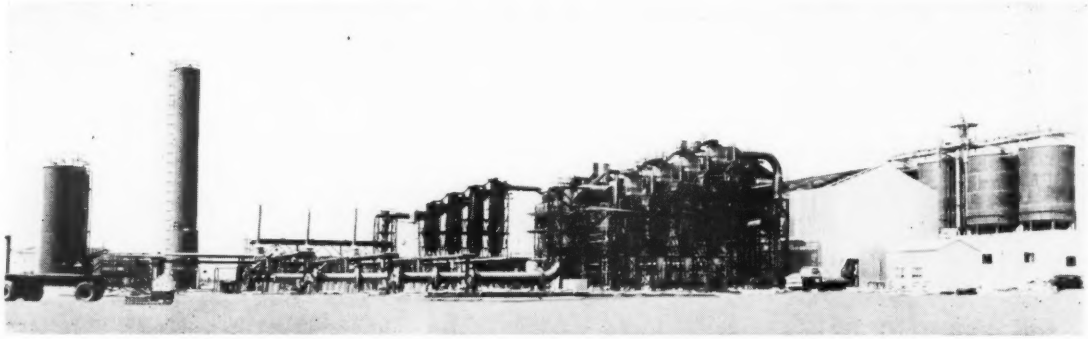
Worldwide Carbon Black Production Gets Boost from Three New Plants

Air view of new Sid Richardson plant to produce furnace blacks

Three new carbon black plants have begun operations over the past few weeks, adding more than 150 million pounds to world productive capacity. Each of these plants, in its own way, has some special significance in the overall industry. Two of the plants are of special importance due to geographical location; while the third, located in the more traditional oil and gas area of Texas, marks the entry of a major channel black producer into the furnace black field. The Sid Richardson plant now in operation at Big Springs, Tex., marks the beginning of furnace black offerings by this former exclusive channel black maker. The growing importance of the West Coast rubber industry is stressed by the placing on stream of Continental Carbon's plant at Bakersfield, Calif. Overseas, United Carbon hopes to supply much of the black used in the heart of the French rubber industry from its plant at Port Jerome. This plant is also designed for all oil feedstocks, thus permitting operation in an area deficient in natural gas supply. All three plants are modern in design with a high degree of automatic control and operation.

Sid Richardson Starts Furnace Black Plant

A new furnace black plant operated by Sid Richardson Carbon Co., Fort Worth, Tex., has gone on stream in Big Spring, Tex., marking Sid Richardson's entry into the furnace black field. The installation, with an annual capacity of 60 million pounds, is currently producing HAF and ISAF types of carbon black under licenses of United Carbon Co., New York, N.Y. Feedstocks are supplied by the Cosden Petroleum Corp. refinery, which is adjacent to the plant.



Overall view of Continental Carbon's new Bakersfield plant

Claimed to be one of the most automated carbon black facilities in the industry, the Big Spring plant features automatic controls on oil, air, gas, and furnace temperatures, as well as highly

sensitive control equipment to compensate for atmospheric changes. Further, bag packing is automated, and packed bags move directly to freight cars and vans by means of a power conveyor. The new plant includes storage capacity for 4,500,000 pounds of various types of carbon black.

Sid Richardson Co. is the largest manufacturer of channel blacks and since 1948 has been operating the world's largest channel black plant at Odessa, Tex.

Carbon Black Production Begins on West Coast

Continental Carbon Co., New York, N. Y., began operations at its new $4-million carbon black plant and laboratories at Bakersfield, Calif., on August 9. The first of its kind on the West Coast, the new plant has an annual capacity of 50 million pounds of oil furnace black.

Witco Chemical Co., Inc., New York, N. Y., worldwide distributor of Continental Carbon's products, will market the plant's output. An estimated 95% will go to the West Coast rubber industry, now the second largest rubber manufacturing center in the United States. Accordingly, the Bakersfield facilities include a modern laboratory fully equipped for rubber testing and compounding. In addition, a staff of traveling technical representatives is available for on-the-spot consultation and assistance at West Coast customer plants.

Specifically designed features of the plant include a highly instrumented, automated system of controls for the precise regulation of temperatures, feedstock flow rates, and other operational conditions of significance to uniformity of product quality; and exclusive patented packaging equipment.

United Carbon's French Plant Now On-Stream

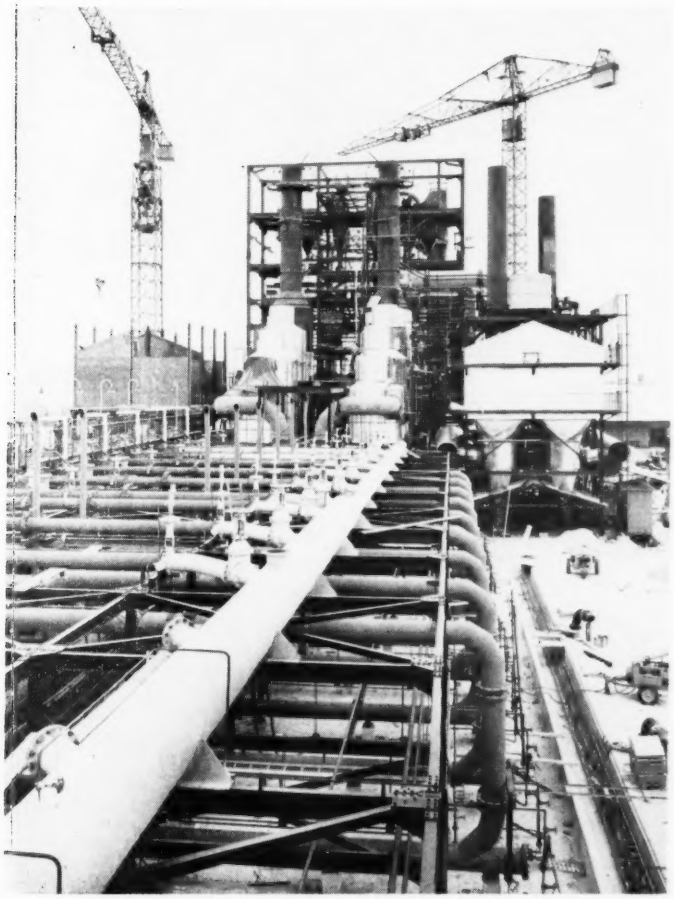
An ultra-modern $5-million carbon black plant operated by United Carbon France S.A., subsidiary of United Carbon Co., Houston, Tex., has gone on stream at Port Jérome, France, with an anticipated annual output of 25,000 metric tons of furnace black which promises to diminish France's importation needs of this product by approximately 50%. The carbon blacks manufactured at the new installation, HAF, ISAF, and FEF, provide an essential raw material for France's rubber, paint, varnish, plastic, and ink industry. HAF and ISAF are, respectively, the first and second largest volume carbon blacks used by the rubber industry; while FEF is fourth.

Port Jerome, shown on this map of France, is the site of United Carbon's new plant in the hub of the French rubber industry

Built by Compagnie Française d'Entreprises, prime contractor for the new factory, the Port Jérome plant is the first in the common market to use fuel oil as a raw material, eliminating the necessity of being located near a source of natural gas. Port Jérome, at the hub of the French rubber industry, offers a superior location for the new unit, with easy access to the rubber manufacturing plants concentrated in northern and central France. The city is also situated in an area where Esso Standard oil feedstocks, delivered by a private pipeline from the refinery, are readily available, enabling United Carbon to service the rubber manufacturers with 24-hour delivery.

A high degree of automation makes this plant one of the most modern and efficient carbon black producing facilities in the world, requiring a staff of only 65 people. An example of an automated installation used in the factory is an electro-pneumatic control, manostat and electronic valve on the two Burton air compressors used which guarantee that when the optimum pressure is reached, the admission valves are closed, and the compressor "shifts into neutral."

Almost all the major equipment in the plant was manufactured in France, except for 12,000 silicone-treated spun-glass fiber filter bags made by Wheelabrator Corp., Mishawaka, Ind., and Engineering Fabrics, Two Rivers, Wis., which are being used in the plant's specifically designed filtering and collecting system. All structural steel and



General view of United Carbon French plant showing reactor area *(center)* and collection system *(right)*

mechanical installations of the systems were produced to United Carbon specifications by the Compagnie Française in its Rouen workshops.

Boilers manufactured by Fives-Penhoet and motors from Constructions Electriques Nancy S.A. and Forges et Ateliers de Jeumont are all explosion-proof, a safety feature of great importance to industries operating in a combustible atmosphere where the slightest spark may set off a holocaust.

In addition to the major manufacturing unit the Port Jérome installation includes a main warehouse 190 by 30 meters, with a capacity of 10,000 tons of finished product; a modernistic office building and testing laboratory; and a separate building which houses locker and shower rooms, and worker facilities.

United Carbon is a major producer of carbon black, with seven plants in the United States, and other operations in Great Britain and Australia. The company is currently constructing carbon black plants in both California and Venezuela.

RMA Molded & Extruded Division Hears Optimistic Outlook for the Future

The effect of current policies by both government and industry on the profits and operations of the members of the Molded & Extruded Products Division of The Rubber Manufacturers Association, Inc., was the major concern of the attendees at the Division's 1961 annual meeting held at The Greenbrier, White Sulphur Springs, W. Va., on June 26, 27, and 28. More than 100 members, wives, and children took part in the business sessions and social activities.

Washington Report

The Monday morning session was opened by Division Chairman Howard W. Smith (Pawling Rubber) and consisted of four talks. The first two of these talks dealt with an appraisal of The New Frontier. Leading off was W. James Sears, RMA vice president and chairman of the public affairs committee. Mr. Sears gave the group a rundown on administration policies, federal government agency attitudes, and Congressional actions and his evaluation of their impact on the rubber business. He makes his headquarters in the RMA Washington office and with his committee specializes in following and interpreting legislation and regulations which could concern the industry. The speaker noted that many businessmen are apprehensive about certain trends in Washington which appear to be of an anti-business nature.

Legislative Report

Following Mr. Sears was the Hon. William H. Ayres, Representative of the 14th Ohio District in Congress, who reported on legislation being pushed in the House. Congressman Ayres, whose district lies in the Akron area, explained the background of many of the bills before the House and also in the Senate and some of the pros and cons being expressed by interested parties. He also gave some of the reasons for his support or opposition to proposed legislation. He noted his interest in the rubber industry due to the heavy concentration of plants in his district and included some comments as to his thoughts on the impact of certain bills on this industry.

The second set of two talks was held Monday morning after a break for coffee. These two talks went into the financial area of the business. William F. Butler, vice president of Chase Manhattan Bank, discussed "The Economic Outlook." Mr. Butler gave his views on the economy both with regard to the year ahead and some of the factors that will influence business in the decade of the 1960's.

Optimistic Economic Outlook

The speaker was very optimistic and predicted a rise in industrial production of 12% in the year ahead—from the second quarter of 1961 to the second quarter of 1962. In the same period he foresees a 9% rise in the gross national product to $556 billion. The number of jobs should expand by 2¾ million.

As some of the reasons for his predictions, Mr. Butler mentioned that the inventory adjustment is about over; the decline in business investment in new plant and equipment, which was very moderate, is about over; housing appears to have turned upward although the increase is expected to be smaller than in previous recovery periods; and government expenditures are headed up. The only major area of the economy where a declining trend is in prospect is in net exports, according to the speaker.

Mr. Butler predicted a rise in the annual rate of personal income after taxes and an overall increase in consumer purchases of goods and services of $25 billion, or 7%. The biggest change is to be in autos, appliances, and other consumer durable goods.

This favorable forecast, which he said would represent a considerable accomplishment, will not accomplish enough. Employment will not be full, nor will we be producing at full capacity.

With full recovery not reached in the year ahead, the problem, according to Mr. Butler, is whether the expansion will continue through 1962 and carry us back to a full use of our productive resources. That would mean a GNP at a rate of some $580 billion at the end of next year.

He said that in his judgment the many forecasters predicting an anemic recovery are wrong, that he believes we will achieve a full recovery. He based his reasons for this belief on two major points. First, are the shift of government policies away from tight money and restrictive measures designed to curb inflation. This speaker does not expect policies that are comparably restrictive this year and next, and, his understatement of the day, ". . . the cost of the New Frontier means that we don't have to worry about large budget surpluses." His second reason is that basic factors underlying markets for durable goods are swinging to the favorable side.

Against this rosy forecast, he told the group, are two possible events which would change the outlook. A wave of speculation in common stocks, if it pushes prices higher, could result in a boom and bust in the all-too-familiar pattern of the past. Events in the international political arena provide another disturbing element. Developments in one of the many areas could have repercussions in U. S. business.

The head table at the June 27 banquet of the RMA Molded & Extruded Products Division included *(left to right)* H. C. Sommer (General Tire), Mrs. Smith, Ed Welch, Mrs. Callanan, H. W. Smith, Mrs. Sommer, Ed Callanan, and Mrs. Welch

F. J. Carter

Problems To Be Solved

Other problems enumerated by Mr. Butler include the necessity of tax revision, the avoidance of inflation, the improvement of quality and quantity of education, securing greater efficiency on the part of business management, and our role in the world economy. These five problems, although there are others, were described as the real economic challenges of the 1960's.

Mr. Butler said, in conclusion, "If the nation can measure up to these challenges, I believe we face an era of unprecedented growth and prosperity. I have no illusions that the nation or the Federal Government will have the great wisdom to follow my advice to the letter. But I have basic confidence that the American people will do what is necessary to support a growing, vital, and exciting economic future."

Keys To Profits

The final speech on Monday was made by C. Richard Dowd, manager of the management services division of Ernst & Ernst, and was titled, "Keys to Profits in the Sixties." He stressed the importance of the fact that profits of U. S. corporations in the last 10 years before provisions for federal income tax have decreased from 35 to 40% in relation to gross sales. In the face of an increase in total assets employed in these corporations, and the vast increases in gross sales, net income before taxes barely held its dollar position. This erosion of gross profits he attributed to the rise in the cost of producing goods without a similar rise in prices. While part of such increased costs are passed on by increased prices of goods, much of the increase is born by the producer.

Mr. Dowd suggested that this profit squeeze could only be alleviated by concentrated attention to cost reduction. Proper management techniques to improve efficiency and productivity must be high on everyone's priority list.

Three Seminars Held

The second morning saw three seminars held concurrently. Each was held twice so that every participant could attend two of the three. One seminar was on "Planning and Programming with Your Salesman" and was led by J. C. Richards, vice president-sales for the B. F. Goodrich Industrial Products Co. The second seminar was titled, "Labor Negotiations and Employe Relations," with F. J. Carter, vice president of Goodyear Tire & Rubber Co., as moderator. The third group discussed "The Profit Squeeze" under the leadership of Mr. Dowd.

Planning with Salesmen

Both sessions of this seminar covered pretty much the same ground and discussed common problems associated with the following subjects: work loads for salesmen, number of calls per day, technical personnel support for field salesmen, payment of salesmen, price authority, selection and training of salesmen, sales meetings, and sales executives calls on major customers.

While there were many differences expressed about these many subjects, there were also many areas of agreement and many ideas collected for partial or full trial upon return home.

The Profit Squeeze

This seminar picked up the subject of profits from Mr. Dowd's prepared address of the previous day. This squeeze was caused, on the one hand, by cost pressures of labor demands, material costs, research and development costs, higher taxes, increased facility costs, higher interest charges, and higher depreciation charges. The other side of the squeeze, the pressure to retard price increases was laid to: foreign competition, falling demand, decrease in profit life cycle and product profit cycle, and overcapacity.

The group saw little chance for much reduction in any of these pressures in the near future. The only hope for offsetting these spiraling costs lies in better planning, the judicious exercise of management talents, and the use of new techniques.

Employe Relations

Both sections of the seminar on union negotiations and employe relations were treated to some fine comment and advice by Mr. Carter. He stressed that it was important to differentiate between union relationship and employe relations and that each must be kept in proper perspective. He discussed the problem of determining what is right and equitable in labor negotiations and of reconciling it with sound business principles. The speaker said that the greatest service a company could render its employes is job security. To achieve this, the business must remain profitable, and it is managements' responsibility to keep it so.

In employe relations he stressed enlightened supervision, fairness, consistency, communications, humility, and good will and confidence.

Mr. Carter summed up with, "The most valuable asset any management can have is the good will and respect of its employes, and every man who is appointed to supervise or direct others should be made aware of this fact, trained and prepared to adequately handle this phase of his responsibility."

Business Session

Summaries of each of the three seminars were given at the final session on Wednesday morning. There were also reports of several working committees. Harry Dinmore (Tyer Rubber) reported on the revisions of the RMA handbook, "Specifications for Molded, Extruded, Lathe-Cut, and Chemically Blown Sponge Rubber Products." Frank V. Smith (Clevite Harris) reported on his committee's work on the portion of this handbook which will deal with Acceptable Quality Levels (AQL). The members were presented with copies of the preliminary draft of this AQL section, which is the result of a full year of work by the committee.

For the RMA staff, Edward Welch, secretary of the Division, reported on the current status of the committee working with the FDA on the food additives amendment, the accomplishments of the recent Milan, Italy, meeting of Technical Committee 45 on Rubber of the International Standards Organization, and other activities of the various RMA committees and staff.

Meeting Well Planned

Much of the success of the foregoing

William H. Ayres

business sessions as well as the fine social activities which included barbeque, banquet, golf, and "The Old White Club" was undoubtedly due to the fine planning and scheduling of the program committee headed by Edward F. Callanan (Clevite Harris). Other members of the committee were Glenn B. Pore (Barr Rubber Products), E. W. Quiggle (Garlock), L. R. Jacobs (Premier Rubber Mfg.), Pierce Sperry (Sperry Rubber & Plastics), and Richard C. Strasser (Western Rubber). Mr. Strasser was assisted by his wife in directing the very enjoyable program for the ladies.

O'Loughlin Retires From U.S. Rubber

R. R. O'Loughlin, buyer of cotton gray goods for United States Rubber Co., New York, N. Y., retired on July 31. His responsibilities were distributed among a group of buyers in the purchasing department.

After serving for two years with the Second Infantry Division of the A.E.F. in France during and immediately after World War I, O'Loughlin returned to Columbia University and was graduated in 1920. The next year he began his forty-year affiliation with U. S. Rubber in the production scheduling department of the tire division; he became buyer of textiles in 1929, a position he held until his retirement.

Controllers Institute Elects Officers

Several members of the rubber industry's financial group have been elected to officerships in the Controllers Institute of America. Established in 1931, the Institute is a non-profit management organization of controllers and finance officers from all lines of business—banking, manufacturing, distribution, utilities, transportation, etc. The total membership at present exceeds 5,200.

Among those elected were Bruce E. Esterly, financial vice president and treasurer, Cooper Tire & Rubber Co., Findley, O., who became treasurer of the Toledo Control of the CIA, and the following, who have been appointed directors of Institute controls in their respective areas: David H. Allen, controller, international division, United States Rubber Co., New York, N. Y., (Newark Control); Raymond F. Hart, treasurer, American Synthetic Rubber Corp., Louisville, Ky., and C. D. Waggoner, vice president and controller, Gates Rubber Co., Denver, Col., (Rocky Mountain Control).

H. G. Bimmerman

Bimmerman Retires

Harry G. Bimmerman, since 1959 manager of the rubber chemicals section of the elastomer chemicals department, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., retired at the end of July after a 33-year career.

Bimmerman received his B.S. in chemical engineering from the Agricultural & Mechanical College of Texas in 1922. Following graduation, he worked for a year as a chemist for the American Cotton Oil Co., and then was employed by the Miller Rubber Co., where he worked as a chemist. In 1928 he joined Du Pont as a chemist and rubber compounder at the Rubber Laboratory, then located at Deepwater Point, N. J., and was appointed director of the Laboratory in 1941.

During his career as a rubber chemist, Bimmerman made many contributions to the advancement of the technology of the industry, particularly in the fields of mechanical rubber goods, blown sponge, and mold lubricants. A member of the American Chemical Society and vice chairman of Committee D-11 on Rubber of the American Society for Testing Materials, he has been active in the establishment of standard test methods for use in the rubber industry.

Warning Given about Explosions in Tires

Isolated instances of automobile tires which have been torn apart by internal explosions have been brought to the attention of tire manufacturers during the past few years. All of these cases seem to have occurred during winter and in the colder areas of the country. Investigations have revealed that in those areas some service-station operators use alcohol- or methanol-base anti-freeze solutions in their air compressors to prevent the air lines from freezing. The resulting gaseous mixture enters the tire under pressure during inflation and evidently can be detonated by a spark of static electricity.

It is also apparent that some commercial rubber lubricants contain a high percentage of combustible solvent and, when used to lubricate tire beads or rims, can produce an explosive mixture with air. So far there has been no fatality from the few tire explosions already known, but there is always the chance that such an explosion could occur in a large truck or off-the-highway tire, where the hazard would be far greater than in the case of an automobile tire.

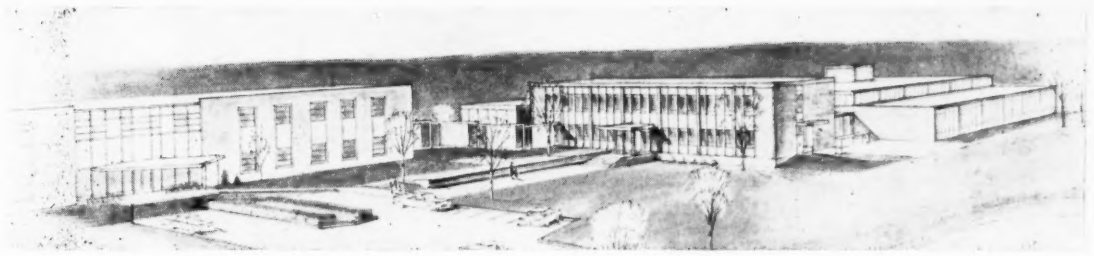
Tire companies stress that a flammable anti-freeze solution should never be placed in an air line or air compressor. Compressors should be regularly checked, serviced, and drained of condensation according to the compressor manufacturer's recommendations. Furthermore, public safety demands that no material which contains a flammable solvent should be used as a tire or rim lubricant. Therefore, when mounting tires on drop center rims, service stations should use only vegetable oil soap and water solution, or rubber company-approved tire lubricants.

Birdsboro Chemical Machinery Division

Birdsboro Corp., Birdsboro, Pa., has formed a chemical machinery division which will manufacture a broad range of chemical process equipment and special-purpose machinery. Henry W. North, president of The H. W. North Co., Erie, Pa., has been appointed manager of the division, which will now make the complete line of North-Erie products previously produced and sold by the North organization. The North company is a 17-year-old contracting and licensing organization which most recently operated independently as designer and supplier of its present line at New Cumberland, Pa.

Products of the new division, Birdsboro's eighth, will be manufactured at the company's Reading, Pa., plant, and will include mixers, blenders, filters, autoclaves, ball mills, dryers, and related equipment having wide application in the chemical, rubber, paint, plastics, rayon, floor covering, food, metals, and munitions industries.

Early plans also call for marketing of an improved quick-opening closure for pressure vessels, and a complete new line of extra heavy-duty Unicentric mill-type drives for cement plants, rubber mills, and other severe service conditions.



Architect's drawing of new Mobay research facility in Pittsburgh, Pa.

Mobay To Build New Research Center

Mobay Chemical Co., Pittsburgh, Pa., is relocating its research headquarters from New Martinsville, W. Va., to suburban Pittsburgh, where the firm has scheduled a large research center for completion in the Fall of 1962. The new location will provide easier access by visiting scientists of customer companies, and a closer alliance of research and marketing services, now centered in Pittsburgh. Research groups allied with plant and process engineering will remain at Mobay's plant location in New Martinsville. Extensive recruiting is now under way for technically trained people to fill new assignments at both locations, resulting from the growing emphasis on chemical research in the urethane product industries.

The complex of new buildings, extending from the present headquarters office on Penn Lincoln Parkway West, midway between the Great Pittsburgh Airport, and the Golden Triangle, will contain about 50,000 square feet of functional area, a main portion of which will be devoted to a demonstration laboratory equipped with commercial-scale production machinery of the kind used by the industry in processing urethane chemicals and polycarbonate resins into end-use consumer products. Interconnecting units will house general research facilities, customer service laboratories, and administrative offices, as well as a technical library.

Flexible and rigid urethane foams, elastomers protective coatings, adhesives, calking compounds, sealants, thermoplastic molded parts, and films, are among the product fields now receiving intensive research study by Mobay.

G-E Lowers Prices on Many Silicone Grades

General Electric Co., Waterford, N. Y., has made price reductions on volume purchases (5,000 pounds or more) of all its silicone rubber gums and reinforced gums and at the same time has cut the price of several silicone rubber compounds on purchases as low as five pounds. A total of 23 compounds, gums, and reinforced gums, is affected, accounting for nearly half of the General Electric silicone rubber line.

The new price schedule, effective August 11, shows reductions ranging from approximately 1½% on some silicone rubber gums up to 6% on certain silicone rubber compounds, based on the 5,000-pound quantity price. Reductions up to 2% at the same purchase level have also been effected on reinforced rubber gum prices.

Jerome T. Coe, general manager of the G-E silicone products department, Waterford, N. Y., said the new low prices reflect the increased sales volume resulting from the silicone rubber gum concept pioneered by G-E ten years ago. Prior to that time, only finished silicone rubber compounds were available from basic manufacturers such as G-E. The gum concept made available to rubber fabricators the more basic silicone rubber gums, enabling them to compound their own silicone rubbers. This action opened the way for fabricators to make their own technical contributions to the field of silicone rubber compounding, as well as effect savings on raw materials. The new concept also enabled the basic manufacturer to concentrate more effort on basic improvements in silicone rubber technology.

The price of all silicone materials has decreased steadily with increasing volume since their appearance in the 1940's when prices ranged up to $18.00 per pound. Current prices for silicone rubber are in the $3.00 to $5.00 per pound range.

W. C. Leingang Retires

William C. Leingang, general manager of The Electric Storage Battery Co.'s Stokes Molded Products Division, Trenton, N. J., retired September 1, after 38 years of service.

Leingang entered the battery firm's employ at Detroit, Mich., as a salesman and sales engineer in 1923, shortly after receiving an E.E. degree from the University of Michigan, where he was an assistant instructor for three years prior to his graduation.

Leingang was transferred to the company's Philadelphia headquarters in 1935 and in 1937 became manager of automotive manufacturing sales. Next, in 1941 he was moved to the staff of the executive vice president. In 1946 and 1947 he supervised construction of the company's Chicago plant, remaining there as its manager until 1953, when he was made assistant general manager of the automotive products division.

Promoted to assistant to the president in 1955, Leingang devoted much of his attention to improving the company's communications. He was appointed general manager of Stokes Molded Products Division, manufacturer of hard rubber and plastic products for consumer and industrial markets, in 1957. He holds a patent on a temperature-control method for voltage relays, generators, and circuits.

He is a life member of the Michigan Union, past president of the Radio Trade Association, a founding director of the Federated Radio Trade Association, and a member of the Society of Automotive Engineers and of the American Institute of Management.

Thiokol Purchases Hi-Polymer Corp.

Thiokol Chemical Corp., Trenton, N. J., has purchased Hi-Polymer Corp., Hudson, Mass., producer of acrylic elastomers. The chemical operations division of Thiokol is producing the acrylic base elastomers in its facilities at Trenton, N. J., and marketing them under the trade mark of Thiacril acrylic rubbers.

Thiacril acrylic rubber 36 will be produced initially, offering properties of resistance to high heat and oils, including oils of the sulfur-bearing type. Application areas for the materials include use as oil-resistant seals, O-rings, and gaskets.

The addition of acrylic rubber by Thiokol broadens a product line which now includes polysulfide rubber and liquid polymers, urethane resins, crude rubber, and rubber chemicals.

industry news

Mobay To Build New Isocyanate Plant

Mobay Chemical Co., Pittsburgh, Pa., a jointly owned associate company of Monsanto Chemical Co. and Farbenfabriken-Bayer AG of West Germany, plans constructing additional multi-purpose plant facilities for the manufacture of a broad range of organic isocyanates.

According to J. D. Mahoney, president of the firm, the new addition, which will have a production capacity of several hundred tons a month, will be adjacent to Mobay's tolylene diisocyanate plant at New Martinsville, W. Va., currently being expanded from 40 million to 50 million pounds' capacity a year. Construction will begin immediately, with completion scheduled for early 1962.

The new facilities are needed, Mahoney indicated, to keep pace with the rapidly growing demand for isocyanates used in the manufacture of pharmaceuticals, herbicides, insecticides, adhesives, protective coatings, and a new urethane elastomer compound for molding and extrusion which was recently introduced by Mobay under the trade name, Texin.

Chemicals to be produced in commercial bulk quantities in the new plant will include meta-chlorophenyl isocyanate, p, p'-diphenylmethane diisocyanate, para-chlorophenyl isocyanate, octadecyl isocyanate, phenyl isocyanate, and other intermediate chemicals related to urethane or isocyanate processing.

U. S. Rubber To Erect Flexzone Plant

A multi-million-dollar plant for the production of Flexzone, an antiozonant-antioxidant which reduces flex-cracking and provides weather protection in tire sidewalls and treads, is being planned by the Naugatuck Chemical Division, United States Rubber Co., New York, N. Y. The facility, adjoining the Monochem, Inc., project announced recently by U. S. Rubber and the Borden Co., is scheduled to go into operation at Geismar, La., in the Spring of 1963. Situated close to raw material sources and markets, Geismar offers a superior location for the new plant, which will become part of a long-term program to make Geismar a major chemical center for the rubber company.

Five months ago Naugatuck Chemical announced the opening of a new plant for a large-scale production of Flexzone, which it had been making on a limited basis since 1957. Up to that time the chemical had been limited to use only in truck and other heavy-duty tires. This expansion made Flexzone available for use in passenger-car tires and other rubber products.

F. Dudley Chittenden, vice president of the rubber company and general manager of its chemical division, indicated that the decision to build the new Louisiana plant was based on an anticipated increase in the use of Flexzone in passenger-car tires.

Firestone Uses "Diene" In Winter Tires

The Firestone Tire & Rubber Co., Akron, O., is using "Diene," a new synthetic rubber closely resembling natural rubber, but superior to it in some respects, in its Town & Country winter tires. Firestone has been producing the synthetic in a new plant at Orange, Tex., since last spring.

Raymond C. Firestone, president, said "Diene" is being used as half of the rubber in Town & Country tire treads. A polybutadiene, it has greater resilience and a lower freezing point than natural rubber and is more resistant to heat and abrasion, qualities which promise to increase tread wear at least 30%.

The company has used "Diene" successfully in the bodies of large truck tires, primarily to reduce the substantial heat buildup, and in the treads of some smaller truck tires to improve wear. Because "Diene" retains its flexibility under extremely cold conditions with a freezing point of —120° F., the use of the synthetic has improved traction on ice and snow, according to Mr. Firestone.

"Diene" blends easily with natural rubber or other types of synthetics, imparting its superior qualities to the blend and thereby improving it. Town & Country winter tires containing "Diene" outwore regular production-line winter tires in tests at Firestone's Ft. Stockton, Tex., track, on commercial fleets throughout the country, and on passenger cars.

obituaries

Charles Muehlstein

Charles Muehlstein, former vice president and director of H. Muehlstein & Co., Inc., New York, N. Y., died in Chicago, Ill., August 13, at the age of 73.

Mr. Muehlstein joined the company when it was formed by his brother in 1911. Shortly thereafter he established the Chicago office, which he directed until his retirement in 1951. Under his leadership this office became a major factor in the growth of H. Muehlstein & Co., Inc.

The deceased is survived by his wife, a son, a daughter, a brother, a sister, and two grandchildren.

C. W. Halligan

Charles W. Halligan, a member of The Rubber Manufacturers Association, Inc., staff for 35 years and a widely recognized expert on cost accounting, died of a heart attack at his home in Massapequa, New York, on August 8.

At the time of his death Halligan was serving the RMA as a consultant. He was the association's treasurer from January, 1951, until his retirement on April 1, 1961. His work included supervision of the RMA's statistical, accounting, and tax activities.

Mr. Halligan was a graduate of Pace Institute of New York and a member of the National Association of Cost Accountants. He was a 32nd degree Mason. During World War I he served in the American Expeditionary Forces, rising from the rank of private to first lieutenant, and served with the occupation forces in 1919 as Assistant Provost Marshal.

He is survived by his wife, two daughters, and three grandchildren.

Roscoe E. Burke

Roscoe E. Burke, founder and chairman of the board of Burke Rubber Co., San Jose, Calif., died suddenly at his home on August 7, at the age of 62.

Prior to founding the firm which bears his name in 1942, Burke worked for two early tire firms in San Jose, Baumgardner Bros. and the Ray Fair Tire Service. The Burke Rubber Co. has grown from a two-man operation to one of the West's important producers of vinyl and asphaltic floor covering and molded rubber products for the industry.

A native Californian, Burke came to the Santa Clara Valley as a young boy. He was graduated from Santa Clara High School. During World War I he served overseas as a crew chief with the American air service. After World War II he was honored by the San Jose Chamber of Commerce for employment of handicapped war veterans in his firm.

Burke was an active member of the San Jose American Legion.

He is survived by his widow, two sons, a brother, a sister, and seven grandchildren.

Funeral services were held at the Oak Hill Mortuary.

Edwin J. Lewis

Edwin J. Lewis, general manager of replacement sales in the B. F. Goodrich Tire Co., died in Akron, O., on July 28.

After graduating from the University

(Continued on page 118)

Look around the

globe....

CABOT CORPORATION

Cabot is the world's largest producer of carbon black . . . the only producer of all three major types (furnace, thermal and channel) . . . offering more different grades than any other manufacturer.

Cabot has more production facilities abroad — more oil furnace black plants world-wide than any other manufacturer. That means fewer problems for you — in shipping and exchange.

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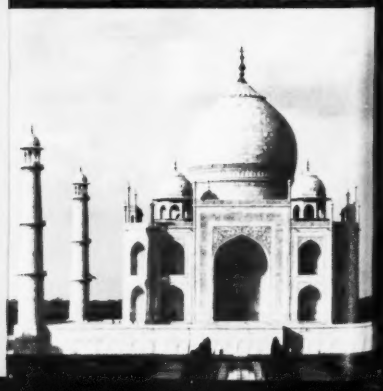

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ITALY — **Cabot Italiana S.p.A.**, Via Larga 19, Milano

AUSTRALIA — **Australian Carbon Black Pty. Limited**, Millers Road, Altona, Victoria (jointly owned)

Printed in U.S.A. September, 196

news briefs

HOUDRY PROCESS CORP., Philadelphia, Pa., and Compagnia Internazionale Generale Industriale—Malatesta, S.p.A., (CIGI), have formed an equally owned company to manufacture and sell polyurethane foam and foam products. The new firm, Montecassino, S.p.A., Cassino, Italy, is expected to launch manufacturing operations late this year. Initially, Montecassino will market its foam and foam products in southern Italy and the Mediterranean basin area. Both rigid and non-rigid polyurethane foam will be manufactured, and the product line will include a wide range of foam items, including padding, cushioning, and insulation.

HENOLITE PRODUCTS, INC., a newly formed corporation for molding foam polystyrene products, begins operations in the early fall at its Phoenixville, Pa., plant, a 1½-story building occupying 8,000 square feet. The new company will be fully equipped to produce a wide variety of products from Dylite expandable polystyrene, currently used for insulation, flotation, containers, and packaging.

PANGBORN CORP., Hagerstown, Md., has established a new department devoted to the manufacture and marketing of special rubber and plastics finishing machines and equipment.

BOSTON WOVEN HOSE & RUBBER DIVISION, American Biltrite Rubber Co., Cambridge, Mass., has appointed Mahoning Valley Supply Co., Cleveland, O., warehousing distributor, covering Ohio, southern Michigan, and western New York.

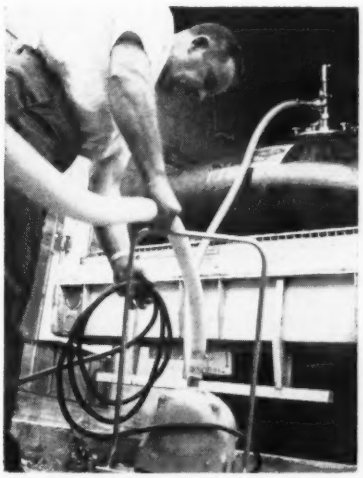
AVISUN CORP., Philadelphia, Pa., will open its new 100-million-pound-per-year polypropylene plant on September 21 at New Castle, Del., making Avi-Sun one of the largest polypropylene producers in the world.

ELECTRIC HOSE & RUBBER CO., Wilmington, Del., has appointed General Tire & Rubber Export Co., Akron, O., exclusive export agent for the company's products, which will be distributed in foreign markets throughout the world, exclusive of the United States, Canada, and the British Isles.

PENNSALT CHEMICALS CORP., Philadelphia, Pa., plans a $2-million expansion of its alkyl amines unit at Wyandotte, Mich., to be completed in early 1962. The project will nearly double Pennsalt's capacity to produce ethylamines, isoproylamines, and butylamines.

R. D. WOOD CO. moved its general offices from the Public Ledger Bldg., Philadelphia, Pa., to Florence, N. J., on August 4, thereby consolidating all company activities in one location.

CARBOLA CHEMICAL CO., INC., Natural Bridge, N. Y., has appointed Dowdy Bros., Philadelphia, Pa., distributor of Asbestol and Micro Velva extender pigments to manufacturers located in eastern Pennsylvania, New Jersey from Trenton south, Delaware, and Maryland.



Speed of handling fresh orange juice at the Cincinnati blending plant of Glacier Groves, Inc., has been more than doubled by the use of a fabric Van Tank, made by The Goodyear Tire & Rubber Co., Akron, O. Filling and emptying of the 4,000-gallon tank takes only 45 minutes and relieves employes of handling heavy steel drums formerly used to carry the juice from Florida.

DESERT MINERALS, INC., Los Angeles, Calif., has appointed Berkshire Chemicals, Inc., New York, N. Y., its eastern distributor. Desert Minerals produces talcs under the trade mark, Desertalc. Berkshire will inventory and distribute all grades of Desertalcs from local warehousing points in Chicago, Cleveland, Boston, New York, and Philadelphia, as well as solicit direct carload business from California to potential consumers in their sales territory.

CANADIAN INDUSTRIES, LTD., Toronto, Ont., Canada, has begun commercial production of its new "Vulcacel" BN plant, located on the site of C-I-L's Hamilton works. "Vulcacel" is used as a blowing agent in the rubber and plastics industries for the manufacture of foamed rubbers and plastics.

SID RICHARDSON CARBON CO., Fort Worth, Tex., has moved its Fort Worth headquarters office to 1105 Fort Worth National Bank Bldg.

UNION CARBIDE CHEMICALS CO., New York, N. Y., has formed an integrated research and development department at its technical center in South Charleston, W. Va.

THE GOODYEAR TIRE & RUBBER CO., Akron, O., has entered into an agreement to acquire the assets of Geneva Metal Wheel Co., Geneva, O. The business will be continued as a wholly owned Goodyear subsidiary, and will retain its present management.

HOUDRY PROCESS CORP., Philadelphia, Pa., will more than double its production capacity for DABCO (triethylenediamene) through construction of a second plant and additional 11,000-square-foot warehouse at Paulsboro, N. J., to be completed by the end of the year.

THE GENERAL TIRE & RUBBER CO., Akron, O., has purchased a 7½-acre tract in Brook Hollow industrial district, Dallas, Tex., on which it will build a 75,000-square-foot warehouse and tire recapping plant in the fall. Warehousing operations will serve the five southwestern states.

news about people

H. W. North

J. H. Rines

Henry W. North, president of The H. W. North Co., Erie, Pa., has been appointed manager of the new chemical machinery division of Birdsboro Corp., Birdsboro, Pa.

Robert N. Wolfe has been made general manager of the adhesives, coatings, and sealers division of Minnesota Mining & Mfg. Co., St. Paul, Minn., succeeding **C. W. Walton,** recently named vice president for research. Succeeding Wolfe as general manufacturing manager is **Robert L. Bucher,** who assumes responsibility for all technical and production activities of the adhesives, coatings, and sealers division.

Bartolomeo DiLiddo has been named senior research engineer, and **Frank J. Donat** and **E. Timothy McDonel** have been appointed senior research chemists on the staff of The B. F. Goodrich Co. Research Center, Brecksville, O.

Ron Raymond has been appointed Akron field representative for United Carbon Co., Inc., New York, N. Y., as a salesman for carbon black and black masterbatch.

R. Raymond

R. J. Salyerds

J. H. Rines has been appointed general manager of sales for Pitt-Consol Chemical Co., Newark, N. J.

E. N. Sizemore has been appointed head of a new regional district office in Cocoa Beach, Fla., for Thiokol Chemical Corp., Trenton, N. J. The office will be under the jurisdiction of the company's southeast district office in Huntsville, Ala.

Peter A. Rubel has joined the organic and polymer research section of the new products research department, Cabot Corp., Cambridge, Mass., as a chemist in the Cambridge laboratories; while **Wendell Potter** has joined the market development of new products section of the development department. **Porter F. Gridley** has become a member of the carbon black applications research section of the carbon black research department as a chemical engineer, and **Reginald Yeung** has joined Cabot as a chemical engineer in the applied research section of the new products research department.

William A. McCormick, Jr., has joined Pangborn Corp., Hagerstown, Md., as department manager for the new department devoted to the manufacture and marketing of special rubber and plastics finishing machines and equipment.

James B. Johnson has been elected vice president, technical director of Linear, Inc., Philadelphia, Pa., in charge of research and development of O-rings and other elastomeric products at the Philadelphia laboratory.

T. L. Kinch has been made advertising director of Hamilton Kent Mfg. Co., Kent, O.

R. J. Salyerds has been named eastern sales manager and technical representative for Alpine Aromatics, Inc., Metuchen, N. J.

John Kilgallon has been appointed Canadian field sales engineer for wire and cable and plastic extruding machinery produced by Davis-Standard, division of Franklin Research & Development Corp., Mystic, Conn.

C. L. Shreiner

H. L. Oplinger

Howard L. Oplinger has been appointed general manager of the Chardon Rubber Co., division of Ball Bros. Co., Inc., at Chardon, O., succeeding **Claude L. Shreiner,** president and general manager of the company, who retired August 31. **Bruce A. Paepke,** controller of Chardon Rubber, has been appointed manufacturing manager.

John D. Cruikshank has been named senior process engineer at the New Castle, Del., film plant of the AviSun Corp., Philadelphia, Pa.

Cleveland Lane has been named assistant to the president of Goodrich-Gulf Chemicals, Inc., Cleveland, O., as supervisor of public relations.

Carl E. Barnes has joined FMC Corp. (formerly Food Machinery & Chemical Corp.), San Jose, Calif., as vice president for research. His primary responsibility will be direction of the research, development, and patent activities of FMC's chemical divisions, and he will make his headquarters at the administrative offices of those divisions in New York, N. Y.

J. Kilgallon

C. E. Barnes

Karl O. Nygaard, manager of wholesale staff for B. F. Goodrich Tire Co. for the past 16 months, has been named manager of market planning for The B. F. Goodrich Co. division, Akron, O.

William J. Barnett has been made sales manager-pigments for the chemical division, pigment and color department, of The Glidden Co., Baltimore, Md., with headquarters at the Adrian Joyce Works in Baltimore. **John Owen Jones** has been named product manager-colors, with headquarters at the St. Helena Works, also in Baltimore.

Howard L. Harwell has been named product manager-flexible foams in the new chemicals group of Union Carbide Chemicals Co., division of Union Carbide Corp., New York, N. Y.

Stephen K. Hawkins, national sales manager of general products for Flexible Tubing Corp., Guilford, Conn., is now situated at the company's central headquarters, after relocating from his former headquarters in Hillside, Ill.

B. I. C. F. van Pul, of the Institute of Rubber Research, TNO Delft, Netherlands, has joined the staff of Ozone Research Corp., Phoenix, Ariz., as vice president of research.

Robert P. Jones, New England division manager of Oakite Products, Inc., New York, N. Y., has been assigned to the New York headquarters of the firm.

George A. Trigaux has been named manager-new product development for Union Carbide Olefins Co., a division of Union Carbide Corp., New York, N. Y.

Robert F. Traflet has been appointed product manager of A-C polyethylene for the plastics division of Allied Chemical Corp., New York, N. Y.

Richard N. Carr has been elected president of Davol Rubber Co., Providence, R. I., succeeding **Ernest I. Kilcup,** who died July 11.

K. O. Nygaard

R. E. Kinnen

Robert E. Kinnen, formerly of Dunlop Tire & Rubber Corp., Buffalo, N. Y., has joined Seiberling Rubber Co., Akron, O., as director of merchandising and advertising. He succeeds **Douglas Mueller,** who recently joined Borg-Warner Corp.

Francis Olmsted has been named assistant to **J. Boyd Britton,** vice president, development, of the Cabot Corp., Boston, Mass.

Franklin Johnston has been named director of research and development-special projects of the newly integrated research and development department of Union Carbide Chemicals Co., New York, N. Y., which will be located at Union Carbide's technical center in South Charleston, W. Va. Also appointed were **John W. Biddle,** director of research and development-polymer chemistry, and **Benjamin Phillips,** director of research and development-organic chemistry. **Lawrence W. Newton** will serve as assistant to **T. R. Miller,** vice president, in the entire research and development organization.

Mark E. Spinney has been appointed Alaskan field sales representative for International B. F. Goodrich Co., Akron, O., with headquarters in Anchorage, Alaska.

Arthur I. Ross has been elected vice president in charge of research and development of the Heel and Sole Division of American Biltrite Rubber Co., Chelsea, Mass.

F. W. Stakelbeck

W. A. Brown

Warren A. Brown, former president of R. D. Wood Co., Florence, N. J., has been elected chairman of the board of directors. Succeeding him as president and chief executive officer is **Fred W. Stakelbeck,** who recently joined the company.

Howard M. Sprock, Jr., has been made sales representative for Hycar special purpose rubber manufactured by B. F. Goodrich Chemical Co., Cleveland, O. Sprock will be responsible for the sale of Hycar latex and dry rubber in southern Virginia and most of North Carolina.

Desmond G. Seymour has been named manager, technical service, of Cabot Carbon of Canada, Ltd., with headquarters at the Sarnia, Ont., plant. Other shifts in Cabot personnel include the transferral of **William L. Leach,** formerly in charge of the Montreal sales office, to the Toronto sales office, as assistant manager; **Thomas Crooks'** appointment as head of the Montreal sales office; **Edward L. Somers'** appointment to the Toronto sales department; **William H. Ehman's** shift from the production department to the technical department, as quality control supervisor to assist Mr. Seymour; and **Alexander Jaychuk's** appointment as process engineer in the production department under **A. J. McKenzie,** production superintendent.

Fred C. Ubinger has been appointed to the product development department, technical division, of Neville Chemical Co., Pittsburgh, Pa.

William C. Nissen has been assigned as project manager-polypropylene in the new products marketing department of Union Carbide Plastics Co., division of Union Carbide Corp., New York, N. Y.

Robert D. Johnson has been named sales representative for Hycar rubber, a product of B. F. Goodrich Chemical Co., Cleveland, O. He will headquarter in Minneapolis, Minn., and will service Minnesota, Iowa, and northern Wisconsin—an area formerly covered from BFG Chemical's Chicago office.

R. N. Carr

R. F. Traflet

A. I. Ross

R. D. Johnson

Franklin Studios

J. Rubin

N Y Times Studio

J. C. Malone

Julius Rubin has been appointed manager of technical sales on a national basis for Thermice Corp., Philadelphia, Pa., with headquarters at Thermice's New York-New Jersey office in Jersey City, N. J.

P. J. Melore

P. G. Apple

Paul J. Melore has joined the sales department of the carbon black and pigment division of Columbian Carbon Co., New York, N. Y., as technical product manager responsible for the sales development functions of Columbian's dispersion units located at Tacony, Philadelphia, Pa., and Deer Park, Tex.

Richard Cassar

M. W. Swaney

Richard Cassar

W. H. Peterson

Walter H. Peterson has been named manager of butyl sales development, a new sales position in Enjay Chemical Co., a division of Humble Oil & Refining Co., New York, N. Y. Replacing him as butyl product manager is **Miller W. Swaney,** formerly with Esso Research & Engineering Co. as coordinator of chemicals research.

James C. Malone has been named general manager of the silicones division, Union Carbide Corp., New York, N. Y., succeeding **Richard S. Abrams,** now manager of development, Union Carbide Olefins Co., a division of Union Carbide.

W. O. Rickard has been appointed district sales manager of mechanical goods in the Detroit, Mich., branch of United States Rubber Co. He will be responsible for mechanical goods sales in a territory covering the southern peninsula of Michigan and 19 counties in Ohio.

A. O. Redland, president and general manager of Vulcanized Rubber & Plastics Co., Morrisville, Pa., has been elected chairman of the board. At the same time, **William F. Heefner,** a partner in the law firm of Curtin & Heefner, and a director of the company, has been named vice president. **Robert J. Dobuski** has been elected to the board of directors and also appointed production manager to head both the rubber and plastics divisions.

Peter G. Apple has been named district sales manager of the newly created Buffalo branch office of Precision Rubber Products Corp., Dayton, O. Succeeding Apple in the Chicago district area is **Harold Kauth,** Precision sales representative in eastern Indiana and western Ohio.

R. Gordon Beattie has been appointed sales manager of the latex and reclaim division, Dominion Rubber Co., Ltd., Montreal, P.Q., Canada, succeeding **D. D. Fraser,** who has been transferred to the company's general products division in Kitchener, Ont. Beattie will headquarter in the Montreal office.

E. J. Lewis

(Continued from page 110)

of Illinois, he joined B. F. Goodrich in Chicago in 1930. Following sales assignments in the Chicago district, he was transferred to Akron in 1943 as a member of the company's advertising department. Holding several positions in the advertising, sales promotion, and tire sales departments, he became manager of petroleum company tire sales and was later manager of passenger-car tire sales. In 1956 the deceased was named merchandising manager of the B. F. Goodrich Tire Co., and in March, 1960, he was made general manager of replacement tire sales.

He was born in Clinton, Ill., January 1, 1908.

Services were held in Cuyahoga Falls, O., on July 31, followed by interment there.

Surviving are the widow, a daughter, a son, two brothers, a sister, and two grandchildren.

An audience of 91,153 persons crowded the Philadelphia Stadium recently to witness the fourth annual Tournament of Thrills, sponsored jointly by Lee Rubber & Tire Corp., Conshohocken, Pa., and Acme Supermarkets, Philadelphia, Pa. Lee used the daredevil automobile stunt vehicles as graphic demonstrators of the ruggedness of its tires. The two-hour program offered a variety of automobile and motorcycle stuntmen in a series of auto rollovers, dive-bombing crashes, pattern driving, and crashes through flaming barriers

Use of Synthetic Rubber Increasing In All Major Industrial Countries

All major industrial countries will use a higher proportion of synthetic rubber this year than they did last year, estimates of the International Rubber Study Group indicate.

In the United States, percentage of synthetic rubber used is expected to rise, while actual consumption of synthetic rubber drops, because of an overall dip in rubber consumption caused by the recent recession.

In every other country, however, actual tonnage of synthetic rubber consumed will increase. One country, the United Kingdom, will have a drop in total new rubber consumption combined with a sizable increase in synthetic use.

Only the United States, which used 69% synthetic rubber last year and is expected to use about 71.6% this year, and Canada, which is expected to increase its proportion of synthetic from 61.4% last year to 64% this year, use more synthetic than natural rubber.

However the United Kingdom, the world's second largest rubber consumer, is expected to use 49.7% synthetic rubber this year, up from 38.1% last year, and France and Germany will both use more than 45%. Australia is expected to use more than 43% synthetic, and most other users are rapidly approaching the 40% figure.

Table 1 shows 1960 consumption and estimated 1961 consumption as announced by the International Rubber Study Group, together with percentages.

TABLE 2. 1965 PLANNED CAPACITY, 1,000 LONG TONS

Country	SBR	IIR	CR	NBR	Stereo	Total	1960	1962
U. K.	103	30	20	12	30	195	81	180
France	90	20	0	5	30	145	25	85
Germany	120	0	10	5	20	155	65	125
Italy	70	0	0	5	20	95	35	85
Netherlands	55	0	0	5	0	60	60	60
Total West Europe	438	50	30	32	100	650	266	535

Country	SBR	IIR	CR	NBR	Stereo	Total	1960	1962
India	30	0	0	0	0	30	0	30
Japan	63	0	10	5	10	88	53	53
Australia	30	0	0	0	0	30	0	30
South Africa	20	0	0	0	0	20	0	0
Brazil	40	0	0	0	20	60	0	40
Argentina	40	0	0	0	20	60	0	0
Mexico	20	0	0	0	0	20	0	0
Total	243	0	10	5	50	308	53	153

TABLE 1. SYNTHETIC/NATURAL RUBBER CONSUMPTION, 1960 *vs.* 1961 (LONG TONS)*

Country	Type	1960	% of New Rubber	1961†	% of New Rubber
U. S. A.	Natural	479,048	31	420 000	28.4
	Synthetic	1,079,245	69	1,060,000	71.6
U. K.	Natural	179,900	61.9	165,000	50.3
	Synthetic	111,100	38.1	123,000	49.7
France	Natural	127,348	58.4	128,000	54.7
	Synthetic	90,776	41.6	98,000	45.3
Germany	Natural	145,700	58.2	141.000	54
	Synthetic	104,400	41.8	120,000	46
Netherlands	Natural	20,524	64	21,000	61.8
	Synthetic	11,526	36	13,000	38.2
Australia	Natural	36,933	59.1	34,000	56.7
	Synthetic	25,487	40.9	26,000	43.3
Brazil	Natural	43,138	72.6	‡9 963	66.3
	Synthetic	16,290	27.4	‡5,072	37.7
Canada	Natural	35,179	38.6	33.000	36
	Synthetic	55,856	61.4	59,000	64
India	Natural	45,215	87.5	§16,008	86
	Synthetic	6,457	12.5	§2,857	14
Japan	Natural	165,860	73	169.000	66
	Synthetic	60,610	27	80.000	34
China	Natural	†133,750	89	¶23 250	65
	Synthetic	†15,750	11	¶12,500	35

* No figures available on Iron Curtain countries.
† Estimated.
‡ Actual three-month total.
§ Actual four-month total.
¶ Estimated four-month total.

The increase in percentage of synthetic rubber consumption is tied in closely with the increase in synthetic rubber production capacity in the major producing countries and a few not so major.

Since to an increasing extent these countries will be using their own synthetic rubber rather than spending dollars to buy it, the increased production will mean increased consumption. Therefore the trend to increased use of synthetic rubber can be expected to continue.

J. D. D'Ianni, liaison for chemical products of Goodyear Tire & Rubber Co., estimated some time ago that non-U.S. production of synthetic would rise to about 2,117,000 long tons in 1965, compared with 1,100,000 long tons last year. As Table 2 indicates, the big increase in Western European production is expected by 1962, increasing from 266.000 long tons in 1960 to 535.000 long tons in 1962. Outside Western Europe, the total for

non-Communist producers will triple between 1960 and 1962, and double again between 1962 and 1965. New production plans announced since these figures were compiled show an even greater expansion than this.

With natural rubber production expected to go up by about 40% in the next four years, the increase in synthetic rubber production and increasing consumption of synthetic rubber may mean a squeeze on the natural rubber producers. It is also expected to cut U. S. exports of synthetic rubber from 300,000 tons in 1960 to 225,000 tons in 1965.

Swedish Patent Granted General Tire on OE-SBR

A Swedish patent, originally filed in 1951, has been granted to The General Tire & Rubber Co. for its high-Mooney oil-extended rubber composition.

This parallels action in the United States when General applied for a patent on November 20, 1950, which was granted on December 13, 1960 (see RUBBER WORLD, January, 1961, page 79). The U. S. patent (No. 2,964,083) was granted after Judge Alexander Holtzoff of the U. S. District Court of the District of Columbia (see RUBBER WORLD, July, 1960, page 101) overruled the U. S. Patent Office Board of Appeals which in 1957 rejected General's bid.

The Swedish patent application was allowed in 1955 and published for opposition purposes, at which time three parties filed suit against General on the grounds that the invention was not patentable and that it was obvious in view of the prior art.

In dismissing the opposition, the Swedish Patent Office made the following significant statements:

"Contrary to the general conception held by those skilled in the art, Applicants (The General Tire & Rubber Co.) have thus proved that the very tough synthetic rubber, plasticized only by large amounts of plasticizer, gives a tread-portion material of high quality.

"Thus the Examination Department finds that the invention, relative to a pneumatic tire, is new and that said invention has inventive merit as well as technical effect, for which reason the patent protection sought for same should not be denied to the Applicant."

This victory represents a further significant step in General's efforts to obtain worldwide protection for this invention.

In essence, General's high-Mooney oil-extended rubber composition, utilizing extremely tough synthetic rubber in proper combination with selected oils, has created an entirely new and superior synthetic rubber which is now being used extensively throughout the rubber industry.

When notified of the award of the U. S. patent, General immediately offered licenses to the entire rubber industry (see RUBBER WORLD, January, 1961, page 79).

Patent infringement suits are pending in the U. S. against The Goodyear Tire & Rubber Co., United States Rubber Co., Firestone Tire & Rubber Co., McCreary Tire & Rubber Co. (see RUBBER WORLD, May, 1961, page 101).

USSR Reorganization of Synthetic Plants

Major changes in the management of Russian synthetic rubber plants are proposed by P. A. Kirpichnikov in the October, 1960, issue of *Soviet Rubber Technology*.

In an article, "Ways of Improving the Organization of Synthetic Rubber Works," Kirpichnikov points out that the main shortcomings of the existing structure are the many small units and the great army of engineering workers in which as many as two in ten are not used to advantage. Furthermore, although the problems connected with technological advancements in the industry have increased tremendously, only one in ten engineering worker is engaged in research.

The article lists the following as the main tasks to be accomplished:

(1) Combine existing works producing a wide range of elastomers and other polymeric materials, since their production is generally based on the same methods and often the same monomers.

(2) Enlarge all main sections to house complete production cycles, such as combining the alcohol and catalyst store, the condensation and alcohol recovery section with the butadiene purification unit, etc.

(3) Remove maintenance from control by engineers, chemists, and technologists in separate sections and centralize it into a single service.

(4) Simplify the main processes of quality control on semi-finished products and of production control and transfer the work from laboratory personnel to control staff. Abolish the raw-material groups which duplicate the control testing carried out by the suppliers.

The plans propose that a managing director would control the activity of the entire plant, determine its development, insure that its efficiency continue to improve, and concentrate on problems of technical policy. A technical director, the first deputy of the manager, would be responsible for both the operative and general management of production. The commercial director would continue to be responsible for the financial and economic activity including product supplies and sales.

In a large department, the article proposes that a head of production be appointed and the deputy heads be removed to eliminate duplication of responsibilities and permit transfer of the personnel freed to research and design work.

This reorganization, it is stated, would increase productivity and make it possible for a large team of specialists to be engaged in creative activities. In addition, such measures would free facilities which could be used for research work. Kirpichnikov also suggests that increased emphasis should be placed on the link between research and production.

Malayan NR Exports Show Slight Gains

Overall Malayan production and exports of rubber during the first half of 1961 continue to show definite, if small, increases. Production at 343,929 tons for the period was 2% more than for the first half of 1960; exports, totaling 556,951 tons, were also 2% higher than in the preceding year.

Malaya's chief customers again were Britain, United States, Japan, and Russia, in that order. Britain's share rose to 94,787 tons, against 85,035 tons; purchases by the United States fell more than 9,000 tons to 60,516 tons. A substantial increase to 57,715 tons in 1961 off-take put Japan in third place, closely followed by Russia, with 56,226 tons.

It may be noted that while Russia's purchases in the 1961 period were almost 40,000 tons higher than in the corresponding 1960 period, China, which had bought 23,032 tons in the first half of 1960, after taking 2,434 tons in January, 1961, kept out of the Malayan market in the succeeding five months.

The natural latex market has been feeling the effects of the inroads of synthetic latices. Total exports of the former in the year 1960 were 10% below exports for 1959, and the figure for the first six months of 1961, at 49,824 tons, is more than 19% under the total for the corresponding 1960 period. Exports to the United States dropped more than 50% to 5,154 tons.

Rubber imports over the same period were practically unchanged—214,676 tons, against 214,774 tons.

The average price during the first half of 1961 was 85.15 cents (Straits) per pound, as compared with 120 Straits cents in the first half of 1960.

New French Isocyanate Company Planned

Etablissements Kuhlmann of Paris, France, and E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., will form a new French company to manufacture and sell isocyanates. Each company will own 50% of the stock of the new firm, to be called Dekachimie, and capitalization will amount to about $6,000,000.

Dekachimie, designed to serve markets in France and other Common Market countries, will build a plant near Lille at Kuhlmann's existing La Madeleine facility. Construction will get under way early next year, and the plant will be completed in 1963. Meanwhile, isocyanates will continue to be exported to European customers from Du Pont's plant in the United States.

Besides the plant site for the new venture, Etablissements Kuhlmann will provide raw materials, service facilities, engineering and construction forces, and employes to operate the plant. Du Pont will provide product technology and engineering consulting services. Both companies will provide capital.

Firestone to Build BR Plant in Brazil

The Firestone Tire & Rubber Co., Akron, O., will operate the first polybutadiene rubber plant in South America, to be constructed at Recife, Brazil, as part of the government sponsored industrial development of northeastern Brazil.

According to J. E. Trainer, executive vice president of Firestone, the plant will have an annual capacity of 27,500 metric tons of polybutadiene, a synthetic said to be superior to natural rubber in some respects. Construction will begin this fall and is expected to be completed in approximately two years.

At the Recife facility, alcohol will be derived from sugar cane as the raw material for the production of butadiene, the principal ingredient in polybutadiene rubber. The plant is located in a vast sugar-cane area which has a plentiful supply of alcohol.

The Recife plant will be the third in which Firestone will manufacture polybutadiene. A plant at Orange, Tex., went on stream last spring with an annual capacity of 30,000 long tons, and production is scheduled to begin in a new plant at Port Jérôme, France, later this year.

Firestone has been active in Brazil since opening a tire plant near Sao Paulo in 1939. Facilities for the production of textiles and foam rubber have since been added to the plant. In 1956 the company established a 22,000-acre rubber plantation near Itubera in the eastern part of the country.

Liberia to Get First Retread Plant

United States Trading Co., a subsidiary of The Firestone Tire & Rubber Co., Akron, O., is opening Liberia's first commercial retread shop in the Free Port of Monrovia, with a production capacity of 125 tires a day. The plant, employing approximately 40 men, will be able to provide additional services and lower tire costs for the increasing number of car and truck owners in the country. The Port Monrovia location makes it possible for U.S.T.C. to service tires from other countries on the West Coast of Africa. Tires may be shipped in, serviced, and shipped out again duty free.

According to C. E. Hoyt, U.S.T.C. manager, natural rubber grown in Liberia will be used for the retreading and repair materials.

"For the first time," he said, "Liberian rubber, which has always been shipped abroad as a raw material, will undergo secondary processing here and be consumed in this country."

This natural rubber camelback, which is used in retreading, will be manufactured and compounded by the Firestone Plantations Co. at Harbel, Liberia.

The shop will be equipped to retread the full range of tire sizes now being used in Liberia from 13-inch passenger-car tires to large tires for trucks and earthmoving equipment.

British Producers To Make Nylon 6

British producers will shortly be producing nylon 6, with construction scheduled on two plants for production of caprolactam, raw material for nylon 6, and two plants to make nylon 6.

British Enka, a subsidiary of Holland's AKU, biggest European producer of nylon 6, announced that it would build a nylon 6 plant in Antrim, Northern Ireland.

Imperial Chemical Industries, Ltd., will build both a caprolactam plant and a nylon 6 plant. Both plants, to be erected at the company's new Severnside development area in Wales, will use technical information and patents from Emser Werke/Inventa, of Switzerland. The caprolactam plant will have a capacity of 15,000 tons a year and will be ready about 1963.

Cortaulds will build a plant with a capacity of 10,000 metric tons a year, probably at Spondon, Derbyshire. It will use a process bought from Italy's Snia Viscosa, which uses toluene as a starting material rather than the usual phenol process. The Italian process is "the most economic process so far discovered," Cortaulds said in its announcement.

Although Cortaulds has made small quantities of nylon 6, most British nylon produced to date has been nylon 66, produced by British Nylon Spinners, jointly owned by Cortaulds and ICI. The nylon salt was supplied by ICI.

European Trade Fairs Show Rubber Goods

Two major trade expositions held during the Spring of 1961 were the British Trade Fair, first British industrial exhibition to take place in Moscow, and the Leipzig Spring Fair, held in East Germany.

British Trade Fair

The British Trade Fair, held this year in Moscow, May 19-June 4, was deemed highly successful, with an expenditure of £2,000,000 by its 677 exhibitors. Practically all the displays, totaling nearly 2,500 tons, were bought on the authority of the Soviet Foreign Trade Ministry. Additional orders were valued at £10,000,000.

Large individual orders obtained by firms in the plastics and rubber industries included a contract with Vickers-Armstrong for a £4,000,000 nylon 66 plant, and a £250,000 order to BTR Industries for belting. The belting, intended for carrying iron ore and nonferrous metals, has an all-Terylene carcass and a nylon breaker with rubber covers made of a special compound capable of withstanding temperatures ranging from 195 to —58° F. In addition, Dunlop received an order for 80, 20-man, self-inflating, life-rafts.

Leipzig Spring Fair

Leipzig was the setting for an international trade fair at which 9,000 exhibitors from 51 countries, including Britain, Italy, and Sweden, exhibited their products. Leipzig has become an economic magnet because of the steadily growing industrial power of the Communist camp. Not merely a commercial success, however, the Leipzig Fair offered excellent opportunities for international exchange of ideas. Recently, for example, a conference on Reciprocal Economic Aid was held there, attended by representatives from the U.A.R., Cuba, Brazil, Burma, Ghana, and Indonesia, as well as from Communist countries. Among these nations, Indonesia and Cuba, as well as the Ivory Coast, were represented this year at the Fair for the first time.

Among East German industrial exhibits were a range of Buna-type rubbers, including cold Buna by V.E.B. Chemical Works Buna, at Schkopau, and the firm's own types of PVC, polyamide, polyvinyl formal and butyral, polyvinyl acetate, low-pressure polyethylene, and unsaturated polyester resins. A tubeless motorcyle tire was

(Continued on page 141)

FBI Checking Leak in Stockpile Talks As Possible Cause of Market Flurry

Natural Rubber

The Justice Department admitted August 15 that it has asked the FBI to investigate a possible leak of government information which may have caused a one-day flurry in the rubber commodity market on June 14.

The leak, the Justice Department felt, may have come from a meeting June 12 of representatives of five government agencies to discuss disposal of $250 million of rubber from the U. S. strategic stockpile.

Trading in rubber futures more than doubled on June 14, hitting 740 long tons compared with 300 long tons traded June 12 and 350 tons traded June 13. The figure was more than double the average for the month.

Of the total traded, 580 long tons were promised for November delivery at an average price of 28.75¢ a pound. This compared with 29.10¢ paid for November rubber on June 13.

It was rumored that representatives of the five agencies, the State Department, Defense Department, Commerce Department, General Services Administration, and Office of Civil & Defense Mobilization, had agreed to drop the cutoff price on stockpile rubber from the present 30¢ to 25¢ a pound. The world rubber price has been moving in a narrow band between 29 and 30¢ for several months.

However, George Casto, chief of the stockpile disposal section of the GSA and secretary of the five-agency committee, denied the report when questioned by a member of the RUBBER WORLD Washington bureau.

Casto said, "I categorically deny there was any agreement or understanding to reduce the floor price of rubber sold from the stockpile reached either at the June 12 meeting or at any other meeting of the interagency committee this summer."

Casto declined to say just what was taken up at the meeting, and on June 14 a "secret" stamp was placed on all inter-departmental correspondence dealing with rubber disposal.

If U. S. stockpile rubber were to be dumped on the market at this point, it would undoubtedly cause a fall in the price of natural rubber, meaning that short sellers would be able to purchase rubber for November delivery at a price substantially below that which they agreed to pay for it.

The procedure of the FBI in making the investigation will be to subpoena records of brokers who handled selling orders June 14 and see whether they can trace any connections to a particular person or group of persons who may have had access to information on the interagency committee decisions.

As a whole, activity in the natural rubber market was slow during the July 16-August 15 period, not unexpected in view of the usual slow summer factory production. On the New York Commodity Exchange, only 2,410 long tons of rubber were traded on the Rex contract during July, and 570 long tons on the Standard contract. These figures compared with 7,130 long tons and 590 long tons, respectively, during June. For the first half of August a total of 1,610 long tons was traded on the Rex contract, contrasted with 1,340 in the first half of July, indicating a slight upturn. This, however, was still slight activity compared with 3,860 long tons traded on the contract in the first half of June.

The slight increase in activity brought some increase in the price of near rubber, from 29.20¢, July 14, to 29.95¢ on August 15. Most of the trading, however, was in near rubber, indicating that U. S. manufacturers are buying only enough rubber to maintain present stocks. Whether the lack of future buying is due to uncertainty about a possible automobile strike, to a feeling that rubber prices are due to sag again, or to other factors, is not clear. Uncertainty about the actual amount of business recovery and possible confusion over the effect that the stereo synthetic rubbers will have on the natural rubber market may be factors contributing to cautious buying.

On the physical market, the price of RSS #1 rose from 29.50¢, July 14, to 30.00¢, August 15, but the average price paid during the month declined. The RSS #1 average for July dropped to 29.41¢, compared with 29.93¢ for June, and the average for the July 16-August 15 period was 29.57¢, against 29.58¢ for the June 16-July 15 period. There were 20 trading days during the month, and 22 in the July 16-August 15 period.

Average prices of other representative grades were: RSS #3, 28.95¢; Amber Blankets, 25.99¢; Flat Bark, 20.13¢.

REX CONTRACT

1961	July 21	July 28	Aug. 4	Aug. 11
July	29.00	——	——	——
Sept.	29.40	29.45	29.50	29.75
Nov.	29.25	29.35	29.35	29.40
1962				
Jan.	29.05	29.15	29.25	29.15

STANDARD CONTRACT

1961	July 21	July 28	Aug. 4	Aug. 11
Sept.	29.27	29.35	29.40	29.65
Nov.	29.15	29.25	29.25	29.30
1962				
Jan.	28.95	29.05	29.15	29.05
Mar.	28.90	28.98	29.05	29.00
May	28.90	28.95	29.00	28.95
July	28.95	28.95	29.00	28.95
Sept.	——	28.95	29.00	28.95

NEW YORK OUTSIDE MARKET

1961	July 21	July 28	Aug. 4	Aug. 11
RSS #1	29.25	29.50	29.63	29.75
#2	29.00	29.37	29.37	29.63
#3	28.75	29.25	29.25	29.50
Pale Crepe				
#1 Thick	33.00	33.25	33.00	33.25
Thin	31.63	31.75	31.50	31.50
#3 Amber				
Blankets	25.85	26.25	26.50	26.50
Thin Brown				
Crepe	25.37	25.85	26.25	26.25
Standard Flat				
Bark	19.75	20.13	20.25	20.25

Tire Cord

The two leading candidates to take over the tire cord market in the not too distant future, polyesters and polyolefins, are a little bit closer to commercial use.

Goodyear Tire & Rubber Co. has disclosed that it is now road-testing tires with polyolefin cords, and The B. F. Goodrich Co. says that it has built some "experimental" tires with polyolefin cords from an unnamed supplier. Neither company will say what

POLYSAR SS 260

a new high in reinforcement . . . a new plus in soling

For applications requiring reinforcing, low gravity and ease of processing, Polymer Corporation now offers Polysar SS-260, an elastomer with a new high degree of self-reinforcement.

Polysar SS-260 is in free-flowing, easily processed, dust free flake form—pure white, non-discoloring and non-staining.

Polysar SS-260 offers worthwhile advantages in the manufacture of high quality nuclear soling, medium quality nuclear soling and work boot soling. For oil-resistant soling, Polysar SS-260 can be used in blends with Polysar Krynacs to give greater oil resistance than previously available, at equivalent vulcanizate hardness.

Write for Polysar Technical Report No. 9: 9A to Marketing Division, Polymer Corporation Limited, Sarnia, Canada.

POLYMER CORPORATION LIMITED
POLYSAR
SARNIA CANADA

*Trade Mark Reg'd.

ONE OF THE WORLD'S MAJOR SOURCES OF RUBBER

DISTRIBUTOR: H. MUEHLSTEIN & Co. Inc., 521 FIFTH AVENUE, NEW YORK 17, N.Y., U.S.A.

NEW POLYSAR SS 260

...extends
a range of
3 self-reinforcing elastomers
for the hardness and flex life
you require

Polysar SS-260 is a white, non-staining copolymer of butadiene and styrene which exhibits a higher degree of self-reinforcement than Polysar SS-250. Polysar SS-260 has the following general properties:

Monomers	Butadiene and styrene
Polymerization system	Cold
Stabilizer type	Non-staining
Coagulant	Brine-acid
Emulsifier	Fatty acid
Total ash (%)	0.97
Volatile matter (%)	0.20
Specific gravity	0.97
Form	Flake

Polysar SS 260
extends the range
of self-reinforcing elastomers
manufactured by Polymer Corporation.
With Polysar SS 260,
Polysar SS 250 and Polysar Kryflex 252
there is now a Polysar rubber
to provide the exact degree
of hardness and flex life
demanded by the application.

There's a Polysar* rubber for every purpose... General Purpose Rubbers —Butadiene-Styrene Copolymers; Oil Resistant Rubbers—Butadiene-Acrylonitrile Copolymers; Special Purpose Rubbers—Butadiene-Styrene Copolymers; Butyl Rubbers —Isobutylene-Isoprene Copolymers; and Latices.

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polyolefin cords are being worked on.

Polyolefins would be strong and apparently cheaper than either nylon or rayon. Weaknesses which have to be eliminated before cord can be marketed commercially are a lower temperature resistance than rayon or nylon, difficulty in adhesion, and flat-spotting.

Experiments on polypropylene indicate that its strength diminishes at the temperatures built up in high-speed driving, but Goodrich reports that it has improved the strength of polypropylene cords 400% by using special primer coatings.

Another candidate, discussed by B. D. Ranby, of the Empire State Paper Research Institute, Syracuse, N. Y., at the Congress of Pure and Applied Chemistry in Montreal, is 4-methyl-1-pentene, which is prepared using Ziegler-type catalysts. He said the material has a melting point of 490° F. and is light and flexible. The monomer price of 15-20¢ a pound would undoubtedly be lower if markets were larger.

Another polymer, 3-methyl-1-butene, loses tensile strength more slowly with rising temperatures than the 1-pentene polymer, but is more difficult to polymerize. Houdry Process Corp., Philadelphia, Pa., is promoting another polymer, 3,3-dimethyl-1-butene, which it makes via its own dehydrogenation process. The material has a melting point around 700° F., highest of any known polyolefin.

At the same time the polyesters are not being neglected. Ted Kersker, manager of fabrics and adhesives development for Goodyear, announced that a new process may have solved the adhesion problem for polyester tire cord.

Kersker said the process involves applying a dip which is short one of the chemicals which make up its resins. When the dipped cord is subjected to temperatures of 450 to 500° F., the molecules are forced to link up with those of the polyester cord, rather than with their own molecules. Another dip is then applied which has an excess of the unnamed chemical. The molecules in this dip then link with those in the first dip. The result, he said, is a cord which adheres firmly to the rubber of the tire.

Polyesters such as Dacron, Vycron, and Vitel are in the strength range of nylon and do not have the flat-spotting characteristics of nylon. Price of the material is high at present, but will undoubtedly be slashed considerably when a commercial tire cord is ready for introduction.

Meanwhile American Viscose Corp. announced that it has developed a new Tyrex rayon yarn which is 15% stronger than current yarns. The yarn, which will be available in all deniers, has a tensile strength of more than 40 pounds in a 1650 denier two-ply cord, according to Gerald S. Tompkins, president of the company.

Total packaged production of high-tenacity rayon yarn in July was 19.5 million pounds, compared with 18.5 million pounds in June. Domestic shipments were 17.2 million pounds, the same as in June, and total shipments were 18.1 million pounds, compared with 18.6 million pounds in June. Stocks at the end of July totaled 20.6 million pounds, against 19.2 million pounds on June 30.

This gas-fired infrared dryer in Goodyear's new tire fabric treating unit at Cartersville, Ga., is scheduled for completion this fall. The unit, first equipped to handle polyester and other experimental tire fabrics, uses a combination of temperature as high as 550° F., stretching, and chemical dips to strengthen and stabilize the fabric

RAYON PRICES

Tire Fabrics

1100/980/2	$0.69
1650/1500/2	.60

Tire Yarns

High-Tenacity	
1100/490	.57
1100/980	.57
1150/490,980	.56
1650/1100	.51
2200/1440	.48
3300/2200	.48

NYLON PRICES

Tire Yarns

840/140	.92
1680/280	.92

Synthetic Rubber

A heavily loaded blend of polybutadiene and natural rubber has definite price advantages over an all-natural tread stock, according to Phillips Oil Co. (Southern Rubber Group, page 92).

Phillips studies show that a blend of 60% polybutadiene and 40% natural rubber loaded up to 70 parts of black and 30 parts of oil gives a price equivalent to all natural rubber at 2¢. This assumes a polybutadiene price of 30¢. At that loading the abrasion resistance of the blend is nearly half again as good as natural rubber, although tensile and modulus are lower and heat buildup higher, Phillips notes.

At the present price of RSS #1, about 30¢ a pound, the present price of a natural rubber tread stock would be about 26.5¢ a pound. The 25¢ rubber which natural rubber producers have been talking about would mean a tread stock of about 22.5¢ a pound.

If Phillips' figures are to be taken at full value, polybutadiene at its present 30¢ price can compete with natural rubber even at 25¢ a pound. This would seem to indicate that polybutadiene prices will be stabilized at about their present level, with the main effort going into oil extension. The question here is whether blends loaded with 30 or more parts of oil will make a satisfactory heavy-duty truck tire, the main market for which polybutadiene producers are shooting at present. It will take a good deal of road testing to tell for sure.

The United States Commerce Department reported that it had authorized the shipment of $6,278,556 in American goods to Russia and satellite countries in the three weeks following President Kennedy's radio talk on Berlin. This was nearly 10 times as much as in the three weeks preceding.

Included in the total were $1.7 million worth of synthetic rubber for Russia, Poland, Hungary, and Czechoslovakia and $38,000 worth of carbon black for Czechoslovakia. The granting of licenses does not mean that the material will be shipped. Russia is expected to import about 50,000 tons of synthetic rubber this year to meet the gap between production and consumption of synthetic rubber. However its trade agreement with Italy calls for importing about 35,000 tons.

On the subject of exports, The Rubber Manufacturers Association, Inc., predicted that only 320,000 long tons of synthetic rubber will be exported by U. S. manufacturers this year, compared with the record 342,000 tons last year. Overseas shipments during the first six months of the year were only 150,000 long tons, against 190,000 during the first half of 1960.

The reason for the anticipated drop, of course, is the rapid expansion of synthetic rubber production facilities abroad, particularly in Western Europe and Japan. Many of these facilities have been built by U. S. companies, many more using U. S. licenses.

However, R. S. Earhart, chief of the chemical division of Goodyear Inter-

national Corp., predicted that the drop in exports will not substantially affect Goodyear or other companies making specialty rubbers or special grades of rubber.

Foreign production, he believes, will be limited to the more conventional types of synthetic used primarily in tires. In certain areas of use such as shoe products, wire and cable, and other applications, there is increasing demand both here and abroad for synthetic rubbers with special qualities and properties, he said. Therefore the dropoff in exports of regular synthetics should be balanced by increasing demand for special grades, he added.

Earhart noted that Goodyear recently put into operation a $1.3 million finishing line for processing high-purity, special-grade SBR rubbers, which features use of stainless-steel equipment throughout to insure highest purity. U. S. producers such as Goodyear, with experience of 20 years in the synthetic rubber business, have the experience and processing techniques to produce special-grade rubbers at a price competitive with standard synthetics, he said. Goodyear is presently producing such special-grade materials as low water absorption or electrical-grade rubbers, improved hot rubbers for plastics modifications, and resin-rubber masterbatches.

Consumption of new rubber in the United States in June was 128,588 long tons, compared with 125,848 tons in May, and 138,790 tons in June of last year, according to the RMA monthly report. Consumption of synthetic rubber reached 92,712 tons, against 90,564 tons in May, and the percentage of synthetic rubber to all rubber used was 72.1%, compared with 72.03% in May.

Consumption of natural rubber in June was 35,876 long tons, compared with 35,284 long tons in May.

Consumption of synthetic rubber (in long tons) by type in June was: SBR, 75,587, against 74,188 in May; CR, 7,088, against 6,563 in May; IIR, 5,117, against 5,142; NBR, 3,134, against 3,067; and stereo and other rubbers, 1,786, against 1,604 in May.

Synthetic rubber production totaled 107,493 long tons, compared with 112,790 tons in May. The latter figure is about 3,000 higher than originally estimated.

Latex

The latex market was very quiet during the July 16-August 15 period, although there was some slight revival of interest in drum latex for nearby shipment during the last week of the period.

Malayan production during June amounted to an estimated 8,720 tons, compared with 8,185 tons during May, bringing the total for the first half of the year to 45,440 tons. Production during the first six months of 1960 was 59,477 tons.

The price of ASTM centrifuged natural latex, in tank-car quantities f.o.b. tank car, was 35.93¢ per pound solids on August 15, against 35.12¢ per pound solids on July 15. Prices of synthetic latices remained at 26 to 40.24¢ for SBR, 37¢ to 57¢ for CR, and 45 to 60¢ for NBR.

(All figures in long tons, dry weight)

Type of Latex	Production	Imports	Consumption	Month-End Stocks
Natural				
May	0	2,796	3,473	8,518
June	0	*	3,804	7,508
SBR				
May	8,614	——	6,971	9,162
June	8,314	——	7,308	10,272
Neoprene				
May	729	——	911	1,573
June	954	——	1,100	1,407
Nitrile				
May	1,095	——	1,113	2,376
June	1,090	——	1,233	2,115

* Not available yet for period covered.

Scrap Rubber

Activity continued routine in the scrap rubber market during the July 16-August 15 period, with consumption continuing about on a level with last year's figures. Supplies are about equal to demand at the moment, and business is expected to rise as the business recovery gains momentum this fall.

Prices of mixed auto tires and black passenger tubes remained unchanged, but prices of mixed auto tubes were up to 5¢ at eastern points and 5.25¢ at Akron, O., compared with 4.75¢ in both categories at the end of the previous period. Prices of butyl tubes were also up, to 6.5¢ for eastern delivery and 6.75¢ for Akron delivery, compared with 6.25¢ for delivery at both points previously.

	Eastern Points	Akron, O.
	Per Net Ton	
Mixed auto tires	$7.00/$11.00	$11.00
S.A.G. truck tires	nom.	nom.
Peeling, No. 1	nom.	nom.
2	nom.	nom.
3	nom.	nom.
	(¢ per Lb.)	
Auto tubes, mixed	5.00	5.25
Black	6.00	6.00
Red	nom.	nom.
Butyl	6.50	6.75

Reclaimed Rubber

The reclaimed rubber market was very slow during the July 16-August 15 period, mainly because of summer vacations and the slackoff in automotive business as companies stopped production of 1961 models and prepared for their 1962-model run.

(Continued on page 141)

12686 12687 12707 13037

HOW TO MAKE NITRILE RUBBER JUMP THROUGH A HOOP

Here are four Durez phenolic resins that can help you get the properties you want in nitrile rubber compounds.

Durez 12687 helps you two ways. As you mill it into the rubber, it softens the stock to give fast, easy milling and rapid loading of filler. Then when the stock cures, the resin cures with it—adding tensile strength, flexural strength, hardness, and rigidity.

You get these results with just a *little* resin—as little as 20 parts per 100 parts of rubber, in a typical recipe. You control the properties by controlling the amount of resin you add.

At higher levels of addition, you can get a fast, complete cure without sulfur or accelerators. The resin gives all the reactivity you need to cure the rubber, often in record time.

Durez 12707 is a resin you'd use in compounds that tend to be scorchy. It cures more slowly. Stocks made with it are lower in hardness and tensile strength, higher in elongation.

Durez 12686 is one you can use on the Banbury without the least worry about scorching. It won't cure *at all* until you add hexa. Then it behaves just like **Durez 12687,** above.

Durez 13037 is similar to 12686 but is in liquid form. Its low viscosity lets you soften the stock still more, without strongly affecting end properties, to get still easier extruding and molding of highly loaded compounds.

This is a good resin for high-durometer stocks that you're laminating or building up onto fabrics, because the resin produces a residual tack at room temperatures which helps the plies stick together.

It is also an excellent modifier for nitrile-phenolic solvent cements, producing better residual tack and flexibility in many cements normally poor in tack.

There are a great many Durez resins you can use to put desired characteristics into nitrile rubber or SBR, natural rubber or neoprene, and to control the properties of solvent-type adhesives. To find out what these resins can do for you, write us.

DUREZ PLASTICS DIVISION

HOOKER CHEMICAL CORPORATION, 209 WALCK RD., NORTH TONAWANDA, N. Y.

HOOKER CHEMICALS PLASTICS

Synthetic Rubbers and Latices*

Monomers

11-80, 100, 200, 112-3 Triols	lb.	$0.225
11-300	lb.	0.265
-400	lb.	0.325
Acrylonitrile	lb.	0.27
Butadiene	lb.	0.15
Dow Styrene	lb.	0.12
H99, N99	lb.	0.205
RG	lb.	0.17
Vinyltoluene	lb.	0.17
Hylene M	lb.	1.25 / $2.75
M-50	lb.	0.86 / 2.36
T	lb.	0.85 / 2.41
TM	lb.	0.70 / 2.26
-65	lb.	0.75 / 2.31
Isobutylene	gal.	0.38
Isoprene	lb.	0.25
Mondur-C	lb.	1.05
Multron R-2	lb.	0.54
P200	lb.	0.23
Rohn & Haas ethyl acrylate	lb.	0.34 / 0.36
Glacial methacrylic acid	lb.	0.40 / 0.425
Methyl acrylate	lb.	0.37 / 0.39
Methylacrylate	lb.	0.29 / 0.31

Shortstops

4P Mercaptan	lb.	0.27 / 0.31
DDM	lb.	0.94 / 0.975
Mercaptan 174	lb.	0.38 / 0.50
Sharstop 204	lb.	0.38 / 0.42
268	lb.	0.52 / 0.53
Tecquinol	lb.	0.825 / 0.845
Thiostop K	lb.	0.50 / 0.53
N	lb.	0.38 / 0.47
Vulnapol KM	lb.	0.52 / 0.56
NM	lb.	0.38 / 0.42
Wingstop B	lb.	0.38

Acrylic Types

Acrylon BA-15	lb.	1.25[a]
EA-5	lb.	1.00[e]
Hycar 4021	lb.	1.34[e] / 1.35[a]
4501	lb.	0.72[e] / 0.78[e]

Latex

Hycar 2600 X 30, 2600 X 83, 2600 X 84	lb.	0.48[e] / 0.54[e]
2601	lb.	0.50 / 0.56[e]
2671	lb.	0.46[e] / 0.52[e]

Butadiene Types (BR)

Cis-4	lb.	0.30
Diene	lb.	0.30

Cold BR Latex

Pliolite Latex 2104	0.325

Fluorocarbon Types

Fluorel KF-2141	lb.	10.00 / 10.25
Kel-F Elastomer	lb.	15.00 / 16.00
5500, 820 (Latex)	lb.	15.00 / 17.15
"Viton" A, AHV, B	lb.	10.00 / 10.25

Isobutylene Types (IIR)

Enjay Butyl 035, 065, 150, 215, 217, 218, 325	0.23[a]
165, 268, 365	0.23[a]
Hycar 2202	0.65[e] / 0.75[e]
Polysar Butyl 100, 200, 300, 301, 400	0.23[d]
402, 450	0.24[d]
600	0.275[d]
Vistanex LM	0.45[a]
MM	0.35[a]

Isoprene Types (IR)

Shell Isoprene Type 300, 305	0.25[a]
307	0.26[a]
500	0.215[a]

Neoprene Types (CR)

Neoprene Type AC, AD, CG	0.55[a]
FB	0.65[a]
GN, GN-A, WB, WX	0.41[a]
GRT, S	0.42[a]
KNR	0.75[a]
W	0.39[a]
WD	0.45
WHV	0.37[a]
W-M1	0.40[a]
WRT	0.45[a]

Latex

Neoprene Latex 571, 842-A	0.37[a]
572	0.39[a]
60, 601-A	0.40[a]
635	0.41[a]
400, 650	0.42[a]
735, 736	0.38[a]
750	0.39[a]
842-A	0.35[a]

Latex

Neoprene Latex 950	$0.47[a]

Nitrile Types (NBR)

Butaprene NF		0.49[b]
NH		0.65[b]
NT		0.50[b]
NXM		0.58[b]
Chemigum, N1NS		0.64[b]
N3NS, N5		0.58[b]
N6, N-6B, N7, N8		0.50[b]
N600		0.50[b]
Hycar 1001, 1041	$0.58[e]	0.59[a]
1002, 1042, 1043, 1052, 1053, 1312	0.50[e]	0.51[e]
1014	0.60[e]	0.61[e]
1072	0.64[e]	0.65[e]
1411	0.62[e]	0.63[e]
1432, 1441	0.59[e]	0.60[e]
Paracril, AJ	0.485[e]	0.495[e]
B, BI, BJLT, BLT	0.50[e]	0.51[e]
C, CLT	0.58[e]	0.59[e]
CV	0.63[e]	0.64[e]
D	0.65[e]	0.66[e]
OZO	0.45[b]	0.46[b]
18-80	0.60[e]	0.61[e]
Polysar Krynac 800, 802, 803, 804		0.50[e]
801, 805		0.58[e]

Latex

Butaprene N-300		0.46[b]
N-400, N-401		0.54[b]
Chemigum 235 CHS, 236		0.53[b]
245 B, 245 CHS, 246, 247, 248, 520		0.45[b]
Hycar 1512, 1552, 1562, 1577	0.45[e]	0.52[e]
1551, 1561, 1571	0.53[e]	0.60[e]
1852	0.46[e]	0.52[e]
Nitrex 2612	0.45[a]	0.52[a]
2616	0.53[a]	0.60[a]
2619	0.52[a]	0.59[a]
2620, 2625	0.45[a]	0.52[a]
Polysar Latex XPRD-845		0.49[e]
Tylac 640, 650	0.45[e]	0.52[e]
750	0.49[e]	0.56[e]
850	0.53[e]	0.60[e]
1640, 1650	0.54[e]	0.61[e]

Polyethylene Type

Hynalon 20	lb.	0.47[a]
30	lb.	0.60[a]
40	lb.	0.50[a]

Polysulfide Type

Thiokol LP-2, -3, -12, -31, -32, -33	0.96[a]
-8	1.35[a]
-205	2.50[a]
-370	3.25[a]
Type-A	0.60[a]
FA	0.74[a]
ST	1.25[a]

Latex

Thiokol Latex (dry wt.) Type MX	0.80[a]
WD-2	1.25[a]
-6 (50% solids)	0.80[a]
(75% solids)	1.25[a]

Silicone Types

GE (compounded)	2.29[e]	4.90[e]
Silicone gum	3.85[e]	4.55[e]
Silastic (compounded)	2.95[b]	3.50[b]
(Partly compounded)	3.15[b]	3.60[b]
(Uncompounded)	4.05[b]	4.35[b]
LS-53	12.00	16.30
Union Carbide (compounds)	2.35[b]	3.20[b]
(Gums)	3.85[b]	4.25[b]

Styrene Types (SBR)

Hot SBR

Ameripol 1000, 1001, 1006, 1007	0.241[e]	0.247[e]
1002	0.2435[e]	0.2495[e]
1006 Crumb	0.2475[e]	0.2535[e]
1009	0.2475[e]	0.2535[e]
Crumb	0.259[e]	0.265[e]
1011	0.2475[e]	0.2535[e]
1012	0.2425[e]	0.2485[e]
Crumb	0.249[e]	0.255[e]
1013	0.241[e]	0.247[e]
Crumb	0.2615[e]	0.2675[e]
ASRC 1004, 1006	0.241[e]	0.2475[e]
1009	0.2475[e]	0.2535[e]
1018	0.27[e]	0.276[e]
1019	0.265[e]	0.271[e]
Copo 1006		0.241[e]
FR-S 1000, 1001, 1004, 1006	0.241[e]	0.247[e]
1007	0.241[e]	0.247[e]
1009	0.2475[e]	0.2535[e]
1010	0.26[e]	0.266[e]
1012	0.2425[e]	0.2485[e]
1013	0.241[e]	0.247[e]
Crumb	0.2615[e]	0.2675[e]
1014	0.281[e]	0.287[e]
141	0.28[e]	0.286[e]
181	0.241[e]	0.247[e]
Naugapol 1010, 1019	$0.265[b]	$0.27[b]
1015	0.35[b]	0.355[b]
1018	0.27[b]	0.275[b]
1022	0.305[b]	0.31[b]
1023	0.33[b]	0.335[b]
6003	0.27[b]	0.275[a]
Philprene 1000, 1006, 6701	0.241[b]	0.247[b]
1009	0.2475[b]	0.2535[b]
1018	0.27[b]	0.276[b]
1019	0.265[b]	0.271[b]
Pliotex 1006	0.241[e]	0.2447[e]
Polysar S, S-630		0.241[b]
SX-370		0.2475[b]
-371		0.255[b]
S-1000, -1006, -1013		0.23[a]
-1002, -1011		0.2325[a]
-1009		0.24[a]
Synpol 1000, 1001, 1006, 1007, 1013, 1061	0.241[b]	0.247[b]
1002	0.2435[b]	0.2495[b]
1009	0.2475[b]	0.2535[b]
Synpol 1012	0.2425[b]	0.2485[b]
8000	0.241[b]	0.247[a]
X-274	0.255[e]	0.261[e]

Hot SBR Black Masterbatch

Philprene 1100	0.194
1104	0.190[b]
S-1100	0.185[a]

Hot SBR Latex

Copo 2000		0.2775[e]
FR-S 2000, 2001	0.2725[e]	0.3425[e]
2002	0.35[e]	0.36[e]
2003, 2004	0.305[e]	0.36[e]
2006	0.29[e]	0.382[e]
Naugatex 2000, 2001	0.275[a]	0.355[a]
2002	0.30[a]	0.37[a]
2006	0.29[a]	0.42[a]
Pliolite Latex 2000, 2001		0.2825
2076		0.295[e]
Polysar Latex IV		0.2775[e]
S-2000, 2006		0.26[a]

Cold SBR

Ameripol 1500, 1501, 1502, 4600, 4601	0.241[e]	0.247[e]
ASRC 1500, 1502	0.241[e]	0.247[e]
1503	0.2652[e]	0.2685[e]
3105, 3106	0.241[e]	0.247[e]
3110	0.26[e]	0.266[e]
C-102		0.23[a]
Baytown 8600		0.241[b]
Copo 1500, 1502, 1507, 1510		0.241[e]
1505-NS		0.251[a]
FR-S 1500, 1502, 146, 179	0.241[e]	0.247[e]
127	0.26[e]	0.266[e]
Gentro 1500		0.241
Naugapol 1503	0.2625[b]	0.2675[b]
1504	0.35[b]	0.355[b]
6100	0.32[b]	0.325[b]
Philprene 1500, 1502	0.241[b]	0.247[b]
1503	0.2625[b]	0.2685[b]
6630	0.251[b]	0.257[b]
6631	0.241[b]	0.247[b]
Plioflex 1500C, 1502, 1507, 1510	0.241[e]	0.247[e]
Polysar Kryflex 200		0.251[b]
202		0.2535[b]
252		0.27[e]
Krylene, NS, 602		0.241[b]
SS-250 (Bale/Flake)		0.2875[e]
S-1500, S-1502		0.23[a]
1509		0.23[a]
Synpol 1500, 1502, 1551, 8103	0.241[b]	0.247[b]

Cold SBR Black Masterbatch

Ameripol 1605	0.19[e]	0.196[e]
4651	0.177[e]	0.183[e]
4659	0.182[e]	0.188[e]
4660	0.187[e]	0.193[e]
4664	0.1845[e]	0.1905[e]
4667	0.208[e]	0.214[e]
Baytown 1600, 1601, 1602		0.193[b]
1606		0.182[b]
1608		0.1845[b]
1609		0.208[b]
8676		0.1876[b]
8679		0.2022[b]
8681		0.1835[b]
B-123		0.182[b]
-129		0.196[e]
-134		0.19[e]
-172		0.1825[e]
Carbomix 1606		0.182[e]
1608		0.1845[e]
1609		0.208[e]
1811		0.1569[e]
CB-102		0.185[a]
Gentro-Jet 9152		0.208
9153		0.182
9154		0.1845
Philprene 1601	0.193[b]	0.199[b]
1603	0.196[b]	0.202[b]
1605	0.19[b]	0.196[b]
1606	0.182[b]	0.188[b]
1608, 6662	0.1845[b]	0.1905[b]
1609	0.208[b]	0.214[b]
6655	0.194[b]	0.20[b]

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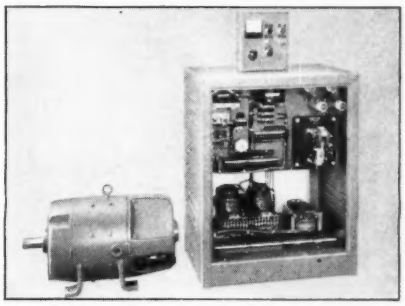
[a] Freight extra.
[b] Minimum freight allowed.
[e] Freight prepaid.
[d] Freight equalized.
* Prices are per pound carload of tank-car dry weight unless otherwise specified.

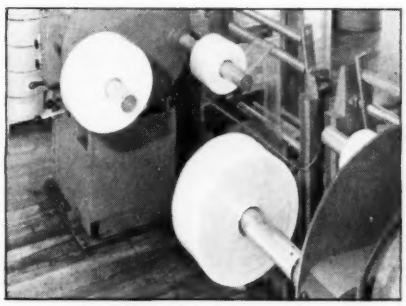
HOBBS VERS-A-WIND DRIVES

with Feed Back Regulation

For Web Winding Applications Requiring a Wide Range of Speed, Controlled Tension and Accuracy



Hobbs Vers-a-wind Drive with Control Panel



The Hobbs Vers-a-wind in use at Turex Plastics Company, Nasonville, Rhode Island.

LITERATURE

The complete line of Hobbs Center-Shaft Web Winding and Unwinding Drives and Hobbs Winding Machines is described and illustrated in "Principles and Practices of Modern Winding". Send for a copy free of all obligations.

TYPE DCS VERS-A-WIND SPEED CONTROL DRIVE

Feedback dancer roll of very light construction operates a transducer which converts mechanical motion to an electrical impulse. This regulates the armature voltage of a DC shunt motor, thus controlling the output speed. Static type control increases reliability and reduces maintenance. Air pressure on dancer roll (which determines the tension) is adjustable. A variation of this type involves varying the field by the feedback principle and varying the armature voltage by a synchronizing tach signal.

Applications are in front of calenders, when rubber and plastic sheeting must be wound under light tension; for windup on any machine where roll weight becomes a large user of the total required torque; when friction in present winding equipment is extremely high; in front of extruders when tremendous speed changes, variable widths and variable diameter buildups are required; when DC power is not available from the process machine to synchronize the winding operation.

TYPE DCT TENSION CONTROL DRIVE

Controls preset tension by controlling the field current with a saturable reactor. Strength of field automatically adjusted to hold armature current constant for any one tension setting. As roll builds up, armature current tries to build up. However, by feedback control, field strength is increased and armature current is held constant at lower r.p.m. Torque output is increased to compensate for increased roll diameter. Maximum constancy of tension over large buildup range. Accuracy of ± 2% over 8:1 or even 10:1 buildup. Used when a DC supply is not available from process machine and synchronization is unnecessary. For each change of processing speed, armature control must be adjusted.

TYPE DCTA TENSION CONTROL DRIVE

Similar to Type DCT, but is designed for process machines equipped with DC powered main drive systems, either rotary (M-G sets) or static (rectified). Armature of winding motor may be paralleled to armature of main drive motor for synchronization. Automatic control separately powers the field and provides winding characteristic.

TYPE DCTS TENSION CONTROL DRIVE

Also similar to Type DCT, but designed for process machines without DC main drives where synchronization is required. Armature supply is automatically controlled for synchronization by signal from a tach generator, which produces the winding characteristic.

Types DCT, DCTA and DCTS are recommended in all instances where a dancer roll affects the material adversely or where the ultimate in accuracy of control is desired.

THE HOBBS LINE INCLUDES 5 OTHER TYPES OF DRIVES —

— Standard CHP, NTJ with Synchronization, APF Progressive Friction, Standard HG Unwind and HG Unwind with Synchronization. Descriptive literature on request.

AIR AND MECHANICAL BRAKES

For unwind applications, alternate air or mechanical brakes can be furnished for automatic or manual control of unwind tension.

WINDING ACCESSORIES INCLUDE —

— web guides, castered bases, mandrels, "Center-Loc" core holders, conventional core chucks, special core chucks, and slitting attachments.

ALSO COMPLETE WINDING MACHINES, INCLUDING —

— light, medium and heavy duty single shaft; medium and heavy duty two-shaft staggered; medium and heavy duty three-shaft staggered; medium duty four-shaft staggered; two-shaft cantilevered fixed shaft and turret; light, medium and heavy duty two-shaft turret, heavy duty two-station shaftless turret; light and medium duty four-shaft duplex turret, and heavy duty three-shaft turret. Type of winding drive used is selected on basis of process specifications and application.

HOBBS

EST 1882

380-0

MANUFACTURING COMPANY

601 Salisbury Street, Worcester 5, Mass.

Direct sales offices in Irvington, N. J., Columbus, O., Chicago, Ill. and Los Angeles, Calif. Representatives in Greenville, S. C. and Toronto, Ont., Canada.

WINDERS · HAND & POWER SHEARS · SLITTERS · AUTOMATIC CUTTERS · DIE PRESSES

S-1600, -1602		$0.1825[a]
-1605		0.18[a]
-1606, -1607		0.175[a]
-7652		0.1875[a]
Synpol 8151	$0.182[b] /	0.188[b]
8152	0.186[b] /	0.192[b]

Cold SBR Oil Masterbatch

Ameripol 1705	0.2035[c] /	0.2095[c]
1707, 1708	0.191[c] /	0.197[c]
1710, 1712	0.1885[c] /	0.1945[c]
4700	0.175[c] /	0.181[c]
ASCR 1703	0.206[c] /	0.212[c]
1708	0.191[c] /	0.197[c]
1712	0.1885[c] /	0.1945[c]
1713	0.175[c] /	0.181[c]
Baytown 8700		0.1885[b]
Copo 1712		0.1885[c]
1713		0.175[c]
1714		0.1725[c]
1773		0.206[c]
1778		0.191[c]
FR-S 1703	0.206[c] /	0.212[c]
1710	0.1885[c] /	0.1945[c]
1712	0.1885[c] /	0.1945[c]
123	0.196[c] /	0.202[c]
154, 155	0.1885[c] /	0.1945[c]
173	0.206[c] /	0.212[c]
178	0.191[c] /	0.197[c]
Gentro 1712		0.1885
Philprene 1703	0.206[b] /	0.212[b]
1708	0.191[b] /	0.197[b]
1712	0.1885[b] /	0.1945[b]
6700	0.175[b] /	0.181[b]
Plioflex 1703, 1773	0.206[c] /	0.212[c]
1710C, 1712C	0.1885[c] /	0.1945[c]
1713	0.175[c] /	0.181[c]
1714C	0.1725[c] /	0.1785[c]
1773	0.206[c] /	0.212[c]
1778	0.191[c] /	0.197[c]
Polysar Krynol 651, 653, 655		0.1885[b]
652, 654		0.191[b]
S-1703		0.195[a]
-1707		0.18[a]
-1709, -1710, -1712		0.1775[a]
-1778		0.18[a]
Synpol 1703	0.206[b] /	0.212[b]
1707, 1708	0.191[b] /	0.197[b]
1712	0.1885[b] /	0.1945[b]
8200	0.191[b] /	0.197[b]
8201, 8208	0.175[b] /	0.181[b]
8202	0.1725[b] /	0.1785[b]

Cold SBR Oil-Black Masterbatch

Ameripol 1805	0.155[c] /	0.161[c]
1808	0.148[c] /	0.154[c]
1809	0.1545[c] /	0.1605[c]
1810	0.140[c] /	0.146[c]
4756	0.1545[c] /	0.1605[c]
4758	0.145[c] /	0.151[c]
4759	0.1598[c] /	0.1658[c]
4760	0.1576[c] /	0.1636[c]
4761	0.171[c] /	0.177[c]
Baytown 1801		0.176[b]
1803A		0.174[b]
1805A		0.176[b]
1808		0.148[b]
1809		0.1545[b]
1811		0.1569[b]
1813		0.164[b]
1815		0.1496[b]
1816		0.158[b]
8682		0.189[b]
8775		0.1545[b]
8776		0.1679[b]
8781		0.1665[b]
8782		0.1583[b]
8783		0.1515[b]
8784		0.1598[b]
B-142		0.1515[b]
Carbomix 1809, 1814		0.1545[c]
1813		0.164[c]
1808		0.148[c]
1815		0.1496[c]
1817		0.1715[c]
3761		0.1576[c]
3764		0.1685[c]
Gentro-Jet 9250		0.158
9251		0.164
9252		0.167
9275		0.150
OB-102		0.1825[a]
-104		0.1475[a]
-110		0.141[a]
Philprene 1803	0.174[b] /	0.18[b]
1805	0.155[b] /	0.161[b]
1808	0.148[b] /	0.154[b]
6753	0.1496[b] /	0.1556[b]
6755	0.1715[b] /	0.1775[b]
S-1800		0.1475[a]
-1802		0.141[a]
-1803		0.165[a]
-1806		0.151[a]
-1807		0.154[a]
-1808		0.142[a]
Synpol 8253	0.1584[b] /	0.1644[b]
8254	0.1545[b] /	0.1605[b]
8255	0.148[b] /	0.154[b]
8267	0.164[b] /	0.17[b]

Cold SBR Rosin Masterbatch

Copo 3900	0.231[c] /	0.237[c]

(Continued on page 141)

Compounding Ingredients

These prices, in general, are f.o.b. works. Where prices are specifically designated as delivered prices by the supplier, they are marked by an asterisk. **The first price column** indicates the carload or tank-car figure. This may also be the truck-load, tank-wagon, or mixed load price. **The second price column** gives a less-than-truck-load figure, based upon a convenient shipping weight of the material in the supplier's normal package. There may be other price breaks for larger quantities such as multi-ton or multi-drum lots. There will also normally be a price increase for special packaging or small quantities. Where the supplier indicates a "standard package" in the listed prices, this price is the one given in the second column. While no prices are included which have not been confirmed by the supplier within the past year, no guarantee is made of these prices. Spot prices should be obtained from individual suppliers.

Accelerators

Accelerator $8	lb.	$1.24	$1.25
49	lb.		0.61
552	lb.	2.24	2.25
808	lb.	0.65	0.68
833	lb.	1.16	1.19
Altax	lb.		0.56
Amax	lb.		0.77
#1	lb.		0.73
Amine O	lb.	0.47	
Arazate	lb.		2.25
Beutene	lb.		0.68
Bismate	lb.		3.00
Butazate	lb.		1.04
Butyl Eight	lb.		1.35
Ziram	lb.		1.03
Captax	lb.		0.46
Chemical-Loaded Molecular Sieve CW-1015, CW-1115, CW-3010, CW-3120, CW-3615, CW-9246	lb.		3.00
Conac S	lb.	0.70	0.73
C-P-B	lb.		1.95
Cumate	lb.		1.45
Cydac Accelerator, Flaked	lb.		0.73
Cyuram DS & Cyuram DS Pellets	lb.		1.14
MS & Cyuram MS Pellets	lb.		1.14
Delac S	lb.		0.73
DIBS	lb.		0.87
Dipac	lb.		0.85
DOTG	lb.		0.72
DPG	lb.		0.52
Ethazate	lb.		1.04
Ethyl Seleram	lb.		3.00
Thiram	lb.		1.03
Tuex	lb.		1.04
Ziram	lb.		1.03
Ethylac	lb.		0.95
Henteen Base	lb.		1.85
K-1960 Silicone Cmpd.	lb.		5.50
Kure-Blend M.T.	lb.	0.70	0.70
Ledate	lb.		1.04
MBT	lb.		0.46
MBTS	lb.		0.56
Methazate #100-L & #50-C	lb.		1.04
Methyl Thiram	lb.		1.13
Ziram	lb.		1.03
Mondur TD-80	lb.		0.70
Monex	lb.		1.14
Multrathane M	lb.	1.25	
NA-22	lb.	1.04	1.05
NOBS #1	lb.		0.73
Special	lb.		0.77
O-X-A-F	lb.		0.57
Pennzone B	lb.		0.68
E	lb.		0.58
Pentex	lb.		1.24
Flour	lb.		0.30
Permalux	lb.	2.24	2.25
Phenex	lb.	0.52	0.59
Poly-Dispersion PAD-60	lb.	0.95	1.10
PBD-75	lb.	3.20	3.35
PDD-70	lb.	1.80	1.95
PDOTGD-65	lb.	1.10	1.25
P (DPG) D-65	lb.	0.95	1.10
PDSD-715	lb.	2.45	2.60
PeTD-70	lb.	1.40	1.55
PGAD-75	lb.	1.60	1.75
PMD-75	lb.	0.80	0.95
PmTD-70	lb.	1.45	1.60
PMzD-75	lb.	1.35	1.50
PND-70	lb.	1.35	1.50
PNPD-72	lb.	1.75	1.90
PRGAD-78	lb.	1.05	1.20
PSANNSD-70	lb.	1.15	1.30
PTD-75	lb.	1.85	2.00
PTetD-70	lb.	2.25	2.40
P (Za) D-75	lb.	1.05	1.20
RIA 66	lb.		0.52
Selenac, Ethyl	lb.		3.00
Methyl	lb.		3.00
SPDX-GH	lb.	0.69	0.74
Sulfads	lb.		1.98
Tellurac: Ethyl	lb.		1.75
Rodform	lb.		1.40
Tetrone A	lb.	1.97	1.98
Thiate A	lb.		0.88
B	lb.		1.25
Thionex	lb.	1.13	1.14
Thiuram E	lb.	1.03	1.04
M	lb.	1.13	1.14
Trimene	lb.		0.58
Base	lb.		1.06
Triphenylguanidine	lb.	0.90	
Tuads, Ethyl	lb.		1.04
Methyl	lb.		1.14
Tuex—for Naugets & Flour	lb.		1.14
Ultex	lb.	1.00	1.10
Unads	lb.		1.14
Vulcacure TMD	lb.		1.14*
ZT	lb.		0.55*
Z-B-X	lb.		2.45
Zenite	lb.	0.53	0.56
A	lb.	0.68	0.71
AM	lb.	0.75	0.78
Zetax	lb.		0.57
Zimate, Butyl	lb.		1.04
Ethyl	lb.		1.04
Methyl	lb.		1.04
ZMBT	lb.		0.57

Accelerators, Latex

Butazate 50-D	lb.		$1.04
Butyl Namate	lb.		0.50
Cyzate B	lb.		0.89
E	lb.		0.89
Ethazate 50-D	lb.		0.89
J-172 Accelerator Dispersion	lb.		0.75
209 Accelerator Dispersion	lb.		1.60
309 Dispersion	lb.		0.85
316 Dispersion	lb.		1.00
754 Dispersion	lb.		0.50
Merac	lb.		1.03
Methyl Ziram	lb.		1.05
Pennac SDB	lb.		0.48
Setsit 5	lb.		1.05
9	lb.		1.15
Tepidone	lb.		0.45
Thiate B	lb.		1.25
Trimene	lb.		0.58
Vulcacure NB	lb.	$0.45*	0.45*
NS	lb.		0.75*
ZB	lb.	0.85*	
ZE	lb.	0.85*	
ZM	lb.	0.85*	
Vult-Accel B	lb.	0.85	
E	lb.	0.85	
Zenite Special	lb.		0.57
Zimate, Butyl	lb.		1.04

Activators

Aktone	lb.	0.2125/	0.2325
Alamine 7	lb.	0.42	
46	lb.	0.22	
H26	lb.	0.37	
AZO ZZZ-11	lb.	0.125 /	0.135
-33	lb.	0.125 /	0.135
-44	lb.	0.125 /	0.135
-55	lb.	0.125 /	0.135
-55-LO	lb.	0.125 /	0.135
-55-TT	lb.	0.125 /	0.135
-66	lb.	0.125 /	0.135
-77	lb.	0.13 /	0.14
-550	lb.	0.125 /	0.135
Barak	lb.		0.65
Catalin Resin 9481	lb.	0.365	
Coconut Fatty Acid	lb.	0.215	
Cottonseed Oil Fatty Acid	lb.	0.1475	
D-B-A	lb.		0.195
Diethylene Glycol	lb.	0.1775	
Elastomag #20, #100, #170	lb.	0.235 /	0.28
Emersol 220 White Oleic Acid	lb.	0.1575/	0.2075
221 Low Titer White Oleic Acid	lb.	0.1575/	0.2075
Hyfac 400 Hydrogenated Fatty Acid	lb.	0.10125/	0.1325
430 Hydrogenated Fish Fatty Acid	lb.	0.16375/	0.195
Kadox-15	lb.	0.13	
-25	lb.	0.135	
-72	lb.	0.13	
Laurex	lb.		0.39
Lauric Acid	lb.	0.45	
Lime, Hydrated	ton	25.85*	
Litharge	lb.	0.1325	
MODX	lb.	$0.295 /	$0.343
Oleic Acid	lb.	0.14 /	0.1978
Pasco Lead-Free Zinc Oxide	lb.	0.125	
Plymouth Zinc Stearate	lb.	0.41	
Poly-Dispersion PGD-50	lb.	2.25 /	2.40
PHZD-70	lb.	0.67 /	0.82
PLD-90	lb.	0.38 /	0.45
P (MgO) D-65	lb.	0.80 /	0.95
PRD-90	lb.	0.38 /	0.45
PZD-85	lb.	0.42 /	0.55
PZND-75	lb.	0.65 /	0.80
-75 (21)	lb.	0.85 /	1.00
-78	lb.	0.65 /	0.80
-84	lb.	0.58 /	0.70
-825	lb.	0.55 /	0.70
PZNPD-80	lb.	1.00 /	1.15
Polymel Actisil Resin	lb.		0.27
Sublac PX-5	lb.	0.115	
Protox-166	lb.	0.125	
-167	lb.	0.125	
-168	lb.	0.13	
-169	lb.	0.13	
-267	lb.	0.1275	
-268	lb.	0.1325	
Ridacto	lb.		0.26
St. Joe Black Label #20	lb.	0.125	
#20-21	lb.	0.125	
Green Label #12	lb.	0.125	
#42	lb.	0.125	
#42-21	lb.	0.125	
#42A-3	lb.	0.125	
#43	lb.	0.125	
Red Label #30	lb.	0.125	
#31	lb.	0.125	
Schenectady SP-1045 Resin	lb.	0.3825	
Seedine	lb.	0.1075	
Special-3	lb.	0.125	
Stearic Acid	lb.	0.10 /	0.125
Dar-Chem 10	lb.	0.1325/	0.1575
Triethanolamine	lb.	0.245	
Wecoline 00	lb.	0.165 /	0.20
AAB	lb.	0.2625/	0.3275
V RO (Vegetable Red Oil)	lb.	0.135 /	0.16
XX-4	lb.	0.125	
-78	lb.	0.13	
-178	lb.	0.125	
-203	lb.	0.125	
Zinc Carbonate	lb.	0.13	
Oxide	lb.	0.115 /	0.145
Stearate	lb.	0.41 /	0.5

Activators, Latex

Kadox-215	lb.	0.135	
Zinc Oxide, Dispersed	lb.		0.21
Dispersion #2	lb.	0.141	

Adhesives and Bonding Agents

Bakelite CLS-3112	lb.	0.205	
Braze	gal.		9.00
Cover Cement	gal.		4.00
Durez 12987	lb.	0.49	
Eastman 910 Adhesive	lb.		75.00
Loxite	gal.		6.20
Thixon B-Series Cements	gal.		6.00
M-Series Cements	gal.		10.00
P-Series Cements	gal.		10.00
X-Series Cements	gal.		20.00
Ty-Ply 3640	gal.		8.00
BC	gal.		6.00
BN	gal.		8.00
Q	gal.		8.00
RC	gal.		5.00
S	gal.		8.00
UP	gal.		8.00

Anti-Blocking Agents, Latex

Dispersion 33	lb.		0.25

Antifoam Agents, Latex

Antifoam P-C	lb.		0.65
Antimussol WL	lb.		1.95
Capryl Alcohol	lb.	0.195 /	0.24
Dow Corning Antifoam A	lb.		4.38
C	lb.		1.67
Foamnix	lb.		0.012
Hallco 365	lb.		0.70
C-451	lb.	0.30 /	0.40
Hodag Antifoam FD-82	lb.	1.63 /	1.73
PV-45B	lb.	0.285 /	0.295
-48	lb.	2.23 /	0.24
TBX	lb.	0.34 /	0.35
J-114 Emulsion	lb.		3.25
SAG 47 Silicone Antifoam Fluid	lb.	4.38	
470 Silicone Antifoam Emulsion	lb.	0.55	
471 Silicone Antifoam Fluid	lb.	2.00	

Antioxidants, Antiozonants, and Inhibitors

AgeRite Alba	lb.		2.50
DPPD	lb.		1.14
Gel	lb.		0.72
Hipar	lb.		1.07
HP	lb.		0.81
ISO	lb.		1.84
Powder	lb.		0.59
Resin	lb.		0.90
D	lb.		0.59
Spar	lb.		0.59

this computer has 16,500 rubber parts

A powerful, solid-state IBM 7090 data processing system, with the maximum number of component units, contains more than 16,500 individual rubber parts. The parts range from molded wire contact relay dampers to the extruded rubber platen assembly. The system is used in the design of jet engines and nuclear reactors, among other applications. It can perform 229,000 additions or subtractions in one second!

Without the rubber industry, this and most other machines wouldn't exist.

Rubber is a vital and basic part of modern technology. In much the same way, RUBBER WORLD is a basic part of the rubber industry. For more than 72 years RUBBER WORLD has supplied its industry with the most complete and up-to-the-minute information available.

This was never more true than today, when RUBBER WORLD leads its field in editorial innovation and in circulation vitality.

By any comparison, RUBBER WORLD is the dominant book.

- 23% more circulation among rubber products manufacturers than the next magazine in the field.
- 66% more circulation among natural and synthetic manufacturers and fabric, machinery and equipment manufacturers.

RUBBER WORLD

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Age Rite Stalite	lb.		$0.59
S	lb.		0.59
Superflex	lb.		0.59
Superlite	lb.		0.59
White	lb.		1.60
Arkoflex C Pellets	lb.		0.87
CD Pellets	lb.		0.81
Aminox	lb.		0.59
Amoco 533 Antioxidants	lb.		0.57*
Antioxidant 425	lb.		2.50
2246	lb.		1.53
Antistatic Agent GM	lb.		0.50
Antisun (Slabbed)	lb.		0.165
Antox	lb.		0.61
Aranox	lb.		3.25
Betanox Special	lb.		0.99
B-L-E & B-L-E-25	lb.		0.59
Catalin Antioxidant CAO-1	lb.	$0.57	
-3	lb.	0.65	
-5	lb.	1.49	
Copper Inhibitor 50	lb.		1.20
Eastzone #32	lb.	1.15 /	1.18
Ethyl Antioxidant 702	lb.	0.84*	
703	lb.	1.21*	
Flexamine G	lb.		0.81
Flexzone 3-C	lb.		1.42
6-H	lb.		1.37
Fura-Tone NC-1012	lb.	0.65	
Heliozone	lb.		0.32
NBC	lb.		1.67
Naugawhite	lb.		0.59
Neozone A Pellets	lb.		0.66
C Pellets	lb.		0.88
D	lb.		0.59
Nevastain A	lb.	0.51 /	0.53
B	lb.	0.51 /	0.61
Nonox CI	lb.		1.55
WSL	lb.		1.47
WSP	lb.		1.50
ZA	lb.		1.99
Octamine	lb.		0.59
Ozono	lb.		0.80
PDA-10	lb.		0.50
Pennox A	lb.		0.59
B	lb.		0.69
C	lb.		0.59
D	lb.		0.59
Pennzone B	lb.		0.68
E	lb.		0.58
Polygard	lb.		0.59
Rio Resin	lb.		0.72
Ross Sunproofing Wax #1343	lb.		0.15
Stabilite	lb.	0.55 /	0.59
Alba	lb.	0.72 /	0.79
White	lb.	0.52 /	0.60
STD	lb.		0.82
-X	lb.		0.52
Suconox-12	lb.		2.50
Sunproof 713	lb.		0.27
Improved	lb.		0.26
Jr.	lb.		0.23
Regular	lb.		0.33
Super	lb.		0.42
Tenamene 3	lb.	0.57 /	0.60
Tenox BHA	lb.		4.75
BHT	lb.		0.68
PG	lb.		4.40
Thermoflex A Pellets	lb.		1.07
Tinuvin P	lb.	6.65	
Tonox	lb.		0.56
UOP 88	lb.	0.94*	
288	lb.	0.94*	
Zalba	lb.		1.10
Special	lb.		0.85

Antioxidants, Antiozonants & Inhibitors, Latex

2,5-Di-tert-butylhydroquinone	lb.		1.17
J-138 Dispersion	lb.		1.30
-139 Dispersion	lb.		1.45
-248 Dispersion	lb.		1.10
-293 Dispersion	lb.		1.33
-413 Dispersion	lb.		0.59
-442 Dispersion	lb.		1.70
-530 Dispersion	lb.		0.65
-588 Dispersion	lb.		0.45
-851 Wax Emulsion	lb.		0.22
Stabilite L	lb.	0.60 /	0.64
Wax Emulsion #5	lb.		0.195

Blowing Agents and Blowing Promoters

B-I-K	lb.		0.22
Celogen	lb.		1.95
AZ	lb.		1.94
Diazoaminobenzene	lb.		0.73
Dow Corning 199	lb.		2.44
EF-4527 Emulsion	lb.		1.59
200 Fluid	lb.		2.47
Magcarb W	lb.	0.195 /	0.235
Nitrosan	lb.		2.25
Poly-Dispersion PC(AZ)D-75	lb.	2.25 /	2.40
PCD-70	lb.	2.70 /	2.85
PKR125D-75	lb.	2.25 /	2.40
P (UND) D-75	lb.	1.05 /	1.20
Sodium Bicarbonate	lb.	0.0255	
Unicel ND	lb.		0.74
NDX	lb.		1.44
S	lb.		0.20
Vulcacel B 40	lb.		1.36
BN	lb.		0.68

‡ At the request of the suppliers, the lowest prices shown for carbon blacks are for carloads in bags. Prices for hopper carloads are lower.

Carbon Blacks‡

CHANNEL BLACKS

Conductive Channel Blacks—CC

Continental R 40	lb.	$0.26 /	$0.35
Dixie 5 Dustless	lb.	0.14 /	0.225
Kosmos/Dixie BB	lb.	0.26 /	0.35
Voltex	lb.	0.26 /	0.35

Easy Processing Channel Blacks—EPC

Continental AA	lb.	0.085 /	0.1625
EPC (Easy Processing Channel)	lb.	0.085 /	0.1625
Kosmobile 77	lb.	0.085 /	0.1625
Micronex W-6	lb.	0.085 /	0.1625
Spheron 9	lb.	0.085 /	0.1625
Witco #12	lb.	0.085 /	0.1625
Wyex EPC	lb.	0.085 /	0.1625

Medium Processing Channel Blacks (MPC)

Arrow MPC	lb.	0.085 /	0.1625
Continental A	lb.	0.085 /	0.1625
Kosmobile S-66	lb.	0.085 /	0.1625
MPC (Medium Processing Channel)		0.085 /	0.1625
Spheron 6		0.085 /	0.1625
Standard Micronex	lb.	0.085 /	0.1625
Witco #1	lb.	0.085 /	0.1625

FURNACE BLACKS

Conductive Furnace Blacks—CF

Aromex CF	lb.	0.0875/	0.155
Conductex SC	lb.	0.13 /	0.215
Beads	lb.	0.115 /	0.19
Continental CF	lb.	0.11 /	0.17
Shawinigan Black	lb.	0.20 /	0.31
Vulcan C	lb.	0.11 /	0.185
SC	lb.	0.18 /	0.255
XC-72	lb.	0.25 /	0.34

Fast Extruding Furnace Blacks—FEF

Arovel FEF	lb.	0.0675/	0.135
Continex FEF	lb.	0.0675/	0.135
Kosmos 50	lb.	0.0675/	0.135
Philblack A	lb.	0.0675/	0.135
Statex M	lb.	0.0675/	0.135
Sterling SO	lb.	0.0675/	0.135

Fine Furnace Blacks—FF

Statex B	lb.	0.0725/	0.14
Sterling 99	lb.	0.0725/	0.14

General Purpose Furnace Blacks—GPF

Arogen GPF	lb.	0.06 /	0.1275
Continex GPF	lb.	0.06 /	0.1275
Kosmos 35	lb.	0.06 /	0.1275
Statex G	lb.	0.06 /	0.1275
Sterling V	lb.	0.06 /	0.1275

High Abrasion Furnace Blacks—HAF

Aromex HAF	lb.	0.0775/	0.145
Continex HAF	lb.	0.0775/	0.145
Kosmos 60	lb.	0.0775/	0.145
Philblack O	lb.	0.0775/	0.145
Statex R	lb.	0.0775/	0.145
Vulcan 3	lb.	0.0775/	0.145

High Modulus Furnace Blacks—HMF

Continex HMF	lb.	0.0625/	0.13
Kosmos 40	lb.	0.0625/	0.13
Modulex HMF	lb.	0.0625/	0.13
Statex 93	lb.	0.0625/	0.13
Sterling L	lb.	00.0625/	0.13

Intermediate Super Abrasion Furnace Blacks—ISAF

Aromex ISAF	lb.	0.0925/	0.16
Continex ISAF-HM	lb.	0.0925/	0.16
Kosmos 70	lb.	0.0925/	0.16
Philblack I	lb.	0.0925/	0.16
Statex 125	lb.	0.0925	0.16
Vulcan 6	lb.	0.0925/	0.16

Low Structure Furnace Blacks

Neotex 100	lb.	0.0775/	0.145
130	lb.	0.0925	0.16
150	lb.	0.115 /	0.19
Regal 300	lb.	0.0775/	0.145
600	lb.	0.0925/	0.16

Semi-Reinforcing Furnace Blacks—SRF

Continex SRF	lb.	0.0575/	0.125
Essex SRF	lb.	0.0575/	0.125
Furnex	lb.	0.0575/	0.125
Kosmos 20	lb.	0.0575/	0.125
Pelletex	lb.	0.0575/	0.125
NS	lb.	0.0575/	0.125
Regal SRF	lb.	$0.0575/	$0.125
Sterling NS	lb.	0.0575/	0.125
S	lb.	0.0575/	0.125

Super Abrasion Furnace Blacks—SAF

Aromex SAF	lb.	0.115 /	0.1325
Kosmos 85	lb.	0.115 /	0.19
Philblack E	lb.	0.115 /	0.19
Statex 160	lb.	0.115 /	0.19
Vulcan 9	lb.	0.115 /	0.19

THERMAL FURNACE BLACKS

Fine Thermal Blacks—FT

P-33	lb.	0.0625/	0.10
Sterling FT	lb.	0.0625	
-FF	lb.	0.0625	

Medium Thermal Furnace Blacks—MT

Sterling MT	lb.	0.045	
-FF	lb.	0.045	
-NS	lb.	0.055	
-FF	lb.	0.055	
Thermax	lb.	0.045 /	0.0825
Stainless	lb.	0.05 /	0.0925

Carbon Blacks, Latex

Black Shield 4	lb.	0.10 /	0.105
6	lb.	0.11 /	0.115
17	lb.	0.125 /	0.13
19	lb.	0.12 /	0.125
Dispersed Black #25	lb.		0.18

Chemical Stabilizers

Litharge	lb.	0.1325	

Coagulants, Latex

Acetic Acid	lb.	0.10	
Calcium Chloride	lb.		0.32
Coagulant #7	gal.	2.00	
Formic Acid	lb.	0.1525	
Glycolic Acid	lb.	0.073	
Hydrochloric Acid	ton	30.00	
Zinc Nitrate	lb.	0.14 /	0.145

Creaming Agents, Latex

Protamon S	lb.	1.10	
Protatek A 155	lb.	0.754	
Superloid	lb.		1.10

Dispersing Agents, Latex

Aerosol OT	lb.		0.75
Alrosol	lb.	0.45	
Casein BI	lb.		0.32
Darvan #1	lb.		0.2825
#2	lb.		0.2675
#3	lb.		0.2675
Naccotan A	lb.	0.1725	
Protovac PK-9	lb.		0.46
PV-8397	lb.		0.58
-8979	lb.		0.45
Sodium Laurate	lb.		0.64
Stearate	lb.		0.47
Webnix	lb.		1.50

Dusting Agents and Dipping Agents

AMC Mica	ton		71.00
Aquazinc	lb.		0.30
Concord Mica	lb.	0.075 /	0.09
Extrud-O-Lube	gal.		1.54
Fibrene C-400	ton		34.00
Glycerized Liquid Lubricant (Conc.)	lb.		1.48
Glyso-Lube Compounds	lb.		0.14
Hydro-Zinc	lb.		0.20
Lubrex	lb.		0.27
160 Mesh Water Ground Biotite Mica	lb.	0.065 /	0.0725
White Water Ground Mica	lb.	0.08 /	0.0875
Mica	lb.		0.0925
C-1000	lb.	0.08 /	0.0875
-3000	lb.	0.0825/	0.09
Micalith-G	lb.	0.0225/	0.0275
Micro-Mica	lb.	0.0825/	0.09
Pigmented Separex	lb.		0.105
#20	lb.		0.115
"LG"	lb.		0.105
"R"	lb.		0.10
Rexanol	lb.		0.13
Sierra White Talc	ton		21.75
Silversheen Mica	lb.		0.075
Talc	ton		9.75
EMTal 42-R	ton	15.70 /	39.00
500	ton	34.00 /	68.90
549	ton	67.00 /	120.00
Triple A Mica	ton	40.00	
Union Carbide LE-420 Silicone Oil Emulsion	lb.	1.18	
Versa-Lube	lb.		0.18
"B"	lb.		0.17

ENJAY BUTYL

best way to handle electricity

Enjay Butyl withstands all the common foes of electrical insulation — heat, water, corona, ozone, sun, weather, and high-voltage discharge. Because of its exceptional heat resistance, Butyl-insulated cable lets you carry a higher current with a given conductor size. Water absorption of Butyl insulation at 90°C is only about one-sixth that of conventional compounds, making it ideal for underground and underwater applications.

Butyl's high dielectric strength prevents excessive loss (with its resultant cable deterioration and increase in transmission cost); also guards against breakdowns due to surge currents. These characteristics have made Enjay Butyl the preferred rubber for insulation of power cable, transformers and bus bars. Coupled with outstanding abrasion resistance, these same characteristics point the way toward increased use of Butyl as a jacketing material.

For more information, write to Enjay, 15 West 51st Street, New York 19, New York.

EXCITING NEW PRODUCTS THROUGH PETRO-CHEMISTRY

ENJAY CHEMICAL COMPANY

A DIVISION OF HUMBLE OIL & REFINING COMPANY

ENJAY® BUTYL

Watergrounnd Mica	*to.*	$0.075 / $0.085
Western #325 Mica	*lb.*	0.0725
Wet-Zinc #40	*lb.*	0.245
"A"	*lb.*	0.2225
"CW," "P"	*lb.*	0.20
Zinc Stearate	*lb.*	0.41* / 0.46*

Finishes

"B" Wax White	*lb.*	0.39
Yellow	*lb.*	0.36
Black-Out	*gal.*	8.00
Chlorine	*lb.*	0.0325
#12 Micro Wax	*lb.*	0.21
15 Micro Wax	*lb.*	0.24
Pumice	*lb.*	0.045
Shellac	*lb.*	0.35
Snow-White Ozokerite #4	*lb.*	0.43
#160	*lb.*	0.305
#180	*lb.*	0.435
3 Star Natural-Yellow Ozokerite	*lb.*	0.34
Snow White Ozokerite	*lb.*	0.47
VanWax	*gal.*	2.05
Wax, Montan, Synthetic	*lb.*	0.50
White Ozokerite #145	*lb.*	0.28
#177	*lb.*	0.39

Gelling Agents, Latex

DOTG	*lb.*	0.72
DPG	*lb.*	0.52
Potassium Silicofluoride	*lb.*	0.095
Sodium Silicofluoride	*lb.*	0.065 / 0.0725
Stay B N2	*lb.*	0.30
Trimene Base	*lb.*	1.06

Miscellaneous Materials, Latex

Aliquat 4	*lb.*	0.58
Anti-Webbing Agent J-524	*lb.*	0.39
Aquarex SMO	*lb.*	0.50
Degell	*lb.*	0.70
Latex Perfumes 5	*lb.*	3.25

Non-Black Materials

AA White Factice	*lb.*	0.2575
Afton Clay	*ton*	14.50
Aiken EW	*ton*	14.50
Albacar 5950, 5960, 5970	*ton*	55.00 / 60.00
Allied K-1	*lb.*	0.07
Whiting	*ton*	11.50
Alsite Clay	*ton*	36.00
Amberex Type B Factice	*lb.*	0.355
B-R Factice	*lb.*	0.36
D Factice	*lb.*	0.435
S Factice	*lb.*	0.325
S-R Factice	*lb.*	0.33
Ammonium Sulfate	*ton*	56.00
Asbestol Regular	*ton*	28.00
Superfine	*ton*	33.00
ASP 106	*ton*	57.00
Atomite	*ton*	35.00
Barber Gilsonite	*ton*	47.00
Barden R. Clay	*ton*	12.00
Barytes 95 White	*ton*	35.00
Barytes, #1	*ton*	60.00 / 60.00
#22	*ton*	30.00
Foam A Brand	*ton*	60.00
Primex Brand	*ton*	66.00
X10R Brand	*ton*	95.00
B. I. White #1	*ton*	10.00
Blanc Fixe	*ton*	160.00
Brown Factice, #173	*lb.*	0.158
-C	*lb.*	0.145
174	*lb.*	0.1875
Brown Vulcanized Vegetable Oils	*lb.*	0.2395
Buca Clay	*ton*	45.00
Cab-O-Sil	*lb.*	1.45
Calcene CO	*ton*	115.00
NC	*ton*	100.00
TM	*ton*	102.50
Calcium Carbonate (Whiting)	*ton*	22.00
C-C-O White Brand	*ton*	28.00
Sulfate	*ton*	60.00 / 65.00
Calwhite	*ton*	22.00
Camel-Carb	*ton*	14.00
-Tex	*ton*	22.00
-Wite	*ton*	35.00
Car-Bel-Lite	*lb.*	0.36
Car-Bel-Rez C	*lb.*	0.126
Catalpo Clay	*ton*	30.00
CCC-#1	*ton*	10.50 / 12.50
-"G"	*ton*	15.00 / 17.00
Celite #270	*ton*	55.00 / 121.00
#315	*ton*	137.00 / 225.00
Champion Hard Clay	*ton*	10.00
Citrus Seed Meal	*ton*	65.00
Clay, #20	*ton*	30.00
30	*ton*	40.00
100	*ton*	65.00
4200	*ton*	13.00 / 36.00
Iceberg	*ton*	53.00
Icecap K	*ton*	65.00
Crown Clay	*ton*	14.50
Darex 430	*lb.*	0.36
Davenite	*lb.*	0.075
DCI Light Magnesium Carbonate	*lb.*	0.11
Dixie Clay	*ton*	14.50
Duramite	*ton*	22.00
Durez 5117	*lb.*	0.94
Durez 11078	*lb.*	$0.355
E Special White Factice	*lb.*	0.21
Earth, Diatomaceous	*lb.*	$0.02
Fabrifil	*lb.*	0.35
Filfloc	*lb.*	0.16
Gamaco	*ton*	35.00
-T	*ton*	40.00
Gamakal	*ton*	40.00
Gilsonite	*ton*	98.50
GK Soft Clay	*ton*	11.50
Glomax HE	*ton*	65.00
LL	*ton*	53.00
PVR	*ton*	40.00
Hakuenka CC	*lb.*	0.061
Harwick Clay #1	*ton*	30.00
-P	*ton*	30.00
2	*ton*	29.00
12	*ton*	45.00
15	*ton*	21.50
42	*ton*	25.00
50-R	*ton*	50.00
-ST	*ton*	47.00
HC-75 Clay	*ton*	12.00
-100	*ton*	14.50
Hi-Sil 233	*lb.*	0.095
Hi-White R Clay	*ton*	14.50
Hydrite	*ton*	50.00
Flat D	*ton*	25.00
PXS	*ton*	45.00
RS	*ton*	30.00
Hydroquinone Di-(β-hydroxyethyl) Ether	*lb.*	1.35
Industrial Filler #100	*ton*	9.05
Kalkarb	*ton*	11.50
Kalmac	*ton*	25.00
Kaolloid Clay	*ton*	11.00
Keystone White	*ton*	22.00
LAC Special White Factice	*lb.*	0.23
LGB Clay	*ton*	17.50
LGP Clay	*ton*	20.00
Lithopone	*lb.*	0.14
Magcarb L	*lb.*	0.215
Magnesia, Calcined	*lb.*	0.23
Heavy	*ton*	120.00
Magnesium Carbonate	*lb.*	0.11 / 0.14
Marbon QBX-1	*lb.*	0.30*
-1E	*lb.*	0.30*
Marter-White RG	*ton*	20.00
Special X	*ton*	21.50
XX	*ton*	24.50
McNamee Clay	*ton*	14.50
Michigan Basic Magnesium Carbonate	*lb.*	0.11
Micro Velva A	*ton*	61.00
B	*ton*	53.00
Micromya	*ton*	35.00
Mistron Vapor	*lb.*	0.035
Modified Brown Vulcanized Vegetable Oils	*lb.*	0.1870
Natka 1200 Hard Clay	*ton*	12.00 / 40.00
Neophax A Factice	*lb.*	0.1885
D Factice	*lb.*	0.36
K Factice	*lb.*	0.1725
Nylon N-16	*lb.*	0.55
OMYA BLR 3	*ton*	60.00
BSH	*ton*	46.50
Par Clay	*ton*	12.00
Paragon Clay	*ton*	14.50
Picco 480 Resins	*lb.*	0.12
SF-140	*lb.*	0.21
Piccoflex Resins	*lb.*	0.16
Pigment 33	*ton*	40.00
Polyfil 40	*ton*	40.00
70	*ton*	53.00
80	*ton*	65.00
C	*ton*	25.00
F & FB	*ton*	30.00
X & XB	*ton*	45.00
PTiD-70 Poly-Dispersion	*lb.*	0.60 / 0.75
Purecal M, O	*ton*	65.00 / 85.00
S, SC, T	*ton*	117.50 / 137.50
U	*ton*	127.00 / 147.50
Pyrax A	*ton*	15.00
W	*ton*	17.50
Pyrophyllite	*ton*	24.50
R-97 White Factice	*lb.*	0.2475
Recco Clay	*ton*	14.50
SC 25 Clay	*ton*	14.50
Schenectady SP-6600 Resin	*lb.*	0.36
-6601 Resin	*lb.*	0.275
-6700 Resin	*lb.*	0.35
-6701 Resin	*lb.*	0.265
Shellflex 310	*gal.*	0.235
371	*gal.*	0.24
Silene EF	*lb.*	0.07
L	*lb.*	0.0725
Silica	*ton*	25.00
Snobrite Clay	*ton*	13.00
Snowflake White	*ton*	22.00
Sparmite	*ton*	95.00
Stonelite	*ton*	11.00
Super Floss	*ton*	110.00 / 175.00
Suprex Clay	*ton*	14.50
Swanee Clay	*ton*	12.50
T-MR Granulated Mineral Rubber	*ton*	65.00
Type-50 Clay	*ton*	14.50
Tysonite	*lb.*	0.3025 / 0.3075
Vanadiset Plastic Resin	*lb.*	0.031
Veroc White	*ton*	12.50
Walnut Shell Flour	*ton*	50.00
#10 White	*ton*	12.00
#56 White Factice	*lb.*	0.1925
-S White Factice	*lb.*	0.165
#57 White Factice	*lb.*	0.175
#60 White Factice	*lb.*	0.22
White Vulcanized Vegetable Oils	*lb.*	0.268
Whitetex	*ton*	53.00
Wilcarbo Carbon Powders	*lb.*	$0.15
Windsor Clay	*ton*	14.50
Wingdale White	*ton*	$17.00
Wood Flour	*ton*	45.00
York White	*ton*	11.50
Zeolex 23	*lb.*	0.06 / 0.07
Zinc Carbonate	*lb.*	0.12* / 0.14*
Oxide	*lb.*	0.115

Non-Black Materials, Latex

ASP-106	*ton*	57.00
-602	*ton*	30.00
HPH	*ton*	33.00
Calwhite-T	*ton*	27.00
Durez 14798	*lb.*	0.225
Harwick Clay #12	*ton*	45.00
#15	*ton*	21.50
#42	*ton*	25.00
Lu-Fil	*ton*	24.00
Marmix 4950	*lb.*	0.275*
7345	*lb.*	0.275*
15720	*lb.*	0.275*
Piccopale Emulsion A-1	*lb.*	0.108
20	*lb.*	0.111
22	*lb.*	0.119
55	*lb.*	0.112
C-1	*lb.*	0.113
N-3	*lb.*	0.122
S-70	*lb.*	0.175
PR Extender 162	*lb.*	0.182
Satintone #1	*ton*	53.00
2	*ton*	40.00
Special	*ton*	65.00
#10-T	*ton*	14.50
UC-55 Clay	*ton*	27.00
-540 Clay	*ton*	45.00

Odorants and Anti-Staining Agents

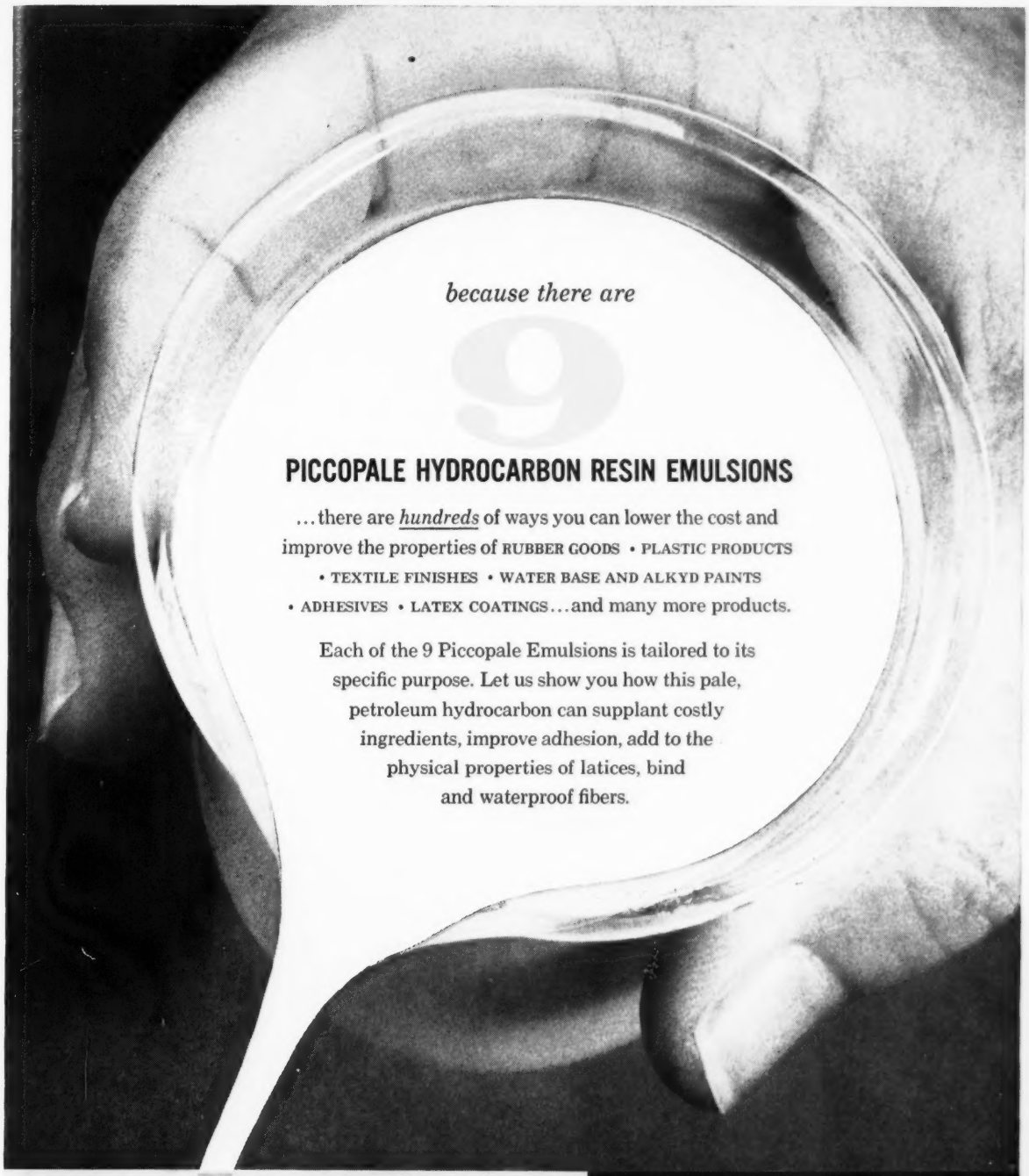
Acetophenone	*lb.*	1.05
Aktone	*lb.*	0.2125/ 0.2325
Aldor Deodorant 067	*lb.*	1.75
272	*lb.*	3.00
276	*lb.*	2.25
5781	*lb.*	1.25
8041N	*lb.*	2.25
Bouquet 149	*lb.*	3.00
Cinnamicaldehyde	*lb.*	0.85
Coumarin	*lb.*	3.40
Darco S-51	*lb.*	0.11
Deodorant 64	*lb.*	2.50
65	*lb.*	2.25
66	*lb.*	2.50
Hydrodarco B	*lb.*	0.07
Irgasan BS 200	*lb.*	2.50
Methyl Salicylate	*lb.*	0.6025*
Neutroleum Delta	*lb.*	2.25
Gamma	*lb.*	3.25
Rodo #0	*lb.*	4.50
10	*lb.*	5.50
Rubber Perfume #5	*lb.*	8.50
Vanillin	*lb.*	6.75

Peptizers

Bondogen	*lb.*	0.605
Hypalon Peptizer H-20	*lb.*	1.59
P-12	*lb.*	2.28
W-9	*lb.*	1.18
Pepton 22 Plasticizer	*lb.*	0.86
Pitt-Consol 640	*lb.*	0.42
(Conc.)	*lb.*	0.70
Plastone	*lb.*	0.25
Polyac Pellets	*lb.*	1.85
RPA #2	*lb.*	0.85
3	*lb.*	0.51
(Conc.)	*lb.*	0.85
6	*lb.*	1.66

Plasticizers and Softeners

AA-1144 Sunproofing Compound	*lb.*	0.17
-1177 Sunproofing Compound	*lb.*	0.145
Castor Oil	*lb.*	0.23
Acintol D Distilled Tall Oil	*lb.*	0.0525/ 0.075
DLR Special Distilled Tall Oil, Low Resin	*lb.*	0.0525/ 0.075
P Tall Oil Pitch	*lb.*	0.0125/ 0.0275
Alitrile 11	*lb.*	0.38
Allied G-1	*lb.*	0.07
Amine O	*lb.*	0.47
Barium Stearate	*lb.*	0.41 / 0.46
Bearflex LPO	*lb.*	0.03
MPO	*lb.*	0.0375
Bunarex Resins	*lb.*	0.085
Bunatak #90	*lb.*	0.09
210	*lb.*	0.14
AH	*lb.*	0.095
N	*lb.*	0.31
U	*lb.*	0.175
Bunaweld Polymer #780	*lb.*	0.24
Butyl Oleate	*lb.*	0.23 / 0.27
Stearate	*lb.*	0.2375/ 0.2775
Calcium Stearate	*lb.*	0.39* / 0.44*
Califlux 510	*lb.*	0.0275
550	*lb.*	0.0275
GP	*lb.*	0.015
LBL	*lb.*	0.17
OSR	*lb.*	0.01875
R-100	*lb.*	0.0475
RC	*lb.*	0.135
TT	*lb.*	0.0195



because there are

9

PICCOPALE HYDROCARBON RESIN EMULSIONS

...there are *hundreds* of ways you can lower the cost and improve the properties of RUBBER GOODS • PLASTIC PRODUCTS • TEXTILE FINISHES • WATER BASE AND ALKYD PAINTS • ADHESIVES • LATEX COATINGS...and many more products.

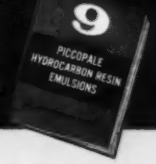
Each of the 9 Piccopale Emulsions is tailored to its specific purpose. Let us show you how this pale, petroleum hydrocarbon can supplant costly ingredients, improve adhesion, add to the physical properties of latices, bind and waterproof fibers.

Make your good products better with Piccopale's cost-saving emulsions...

- **A-1** for styrene-butadiene water-base systems
- **A-3** for alkyd latex or drying oil latex systems
- **A-20** for harder films and natural rubber latex adhesives
- **A-22** an acid-stable emulsion, for polyvinyl acetate systems
- **A-41** for special adhesives
- **A-43** for improved wet and dry strength of non-vulcanized SBR latices
- **A-55** for SBR and natural rubber latex in vulcanized systems
- **C-1** a cationic emulsion for heavy fiber boards and wet end sizing
- **N-3** for non-ionic applications and as a stabilizing emulsion

WRITE for complete technical data on Piccopale Hydrocarbon Resin Emulsions...and for your free copy of

OUR NEW 12-PAGE PICCOPALE EMULSION CATALOG



PENNSYLVANIA INDUSTRIAL CHEMICAL CORPORATION

122 STATE STREET • CLAIRTON • PENNSYLVANIA

Catalin Resin 8318	lb.	$0.3425	
Citroflex 2	lb.	0.4375	
4	lb.	0.40	
A-2	lb.	0.37	
-4	lb.	0.33	
Contogums	lb.	0.1275	
Cyclolube 4053	gal.	0.21	
OSR	gal.	0.28	
Dextro-Limonene	lb.	0.12	
Dibenzyl Sebacate	lb.	0.91 /	$0.94
Dibutyl Phthalate	lb.	0.29 /	0.33
Sebacate	lb.	0.655 /	0.685
Dicapryl Phthalate	lb.	0.265 /	0.305
Di-"Carbitol" Phthalate	lb.	0.485 /	0.51
Diethyl Phthalate	lb.	0.2725/	0.3125
Di-(2-Ethylhexyl) Azelate	lb.	0.425 /	0.465
Phthalate	lb.	0.245 /	0.285
Diglycol Laurate	lb.		0.57
Oleate	lb.		0.57
Stearate	lb.		0.37
Diisobutyl Phthalate	lb.	0.275 /	0.315
Dimethyl Phthalate	lb.	0.2725/	0.3125
Dioctyl Adipate	lb.	0.36 /	0.40
Phthalate	lb.	0.245 /	0.285
Sebacate	lb.	0.5775/	0.6175
Durez 11504	lb.	0.345	
12686	lb.	0.365	
12687	lb.	0.375	
12707	lb.	0.375	
13037	lb.	0.35	
13349	lb.	0.28	
13355	lb.	0.29	
Duttex 419	lb.	0.032	
726	gal.	0.13	
739	lb.	0.0275	
757	gal.	0.13	
786	gal.	0.14	
787	gal.	0.13	
896	gal.	0.13	
Emery 906 Tall Oil Pitch	lb.	0.0125/	0.0375
Endor	lb.		0.67
Estynox 408	lb.		0.3775
Flexricin 13	lb.		0.4225
P-1	lb.		0.365
-4	lb.		0.3325
-6	lb.		0.40
-8	lb.		0.3325
Futa-Tone NC-1008	lb.	0.30	
Galex W-100	lb.	0.2075	0.245
D	lb.	0.2025	0.24
Glycerin	lb.	0.2475/	0.2725
Glycerol Mono-Oleate	lb.		0.57
Monoricinoleate	lb.		0.68
Monostearate	lb.		0.35
Hallco 3880	lb.	0.485 /	0.53
C-311	lb.	0.34 /	0.38
-325	lb.	0.34 /	0.38
-392	lb.	0.65 /	0.685
-428	lb.	0.455 /	0.505
-494	lb.	0.5925/	0.6225
-496	lb.	0.5925/	0.6225
-497	lb.	0.40 /	0.435
-498	lb.	0.455 /	0.505
-503	lb.	0.23 /	0.26
-566	lb.	0.11 /	0.13
-642	lb.	0.65 /	0.685
HA-5-A	lb.	0.805 /	0.81
-7-A	lb.	0.55 /	0.555
-57-A	lb.	0.76 /	0.765
Harflex 300	lb.	0.58 /	0.615
325	lb.	0.4325/	0.46
330	lb.	0.4425/	0.4725
375	lb.	0.7425/	0.77
Heavy Oil #1-D	lb.		0.065
Indonex W-2	lb.		0.13
Indopol H-100	gal.	0.85	
-300	gal.	1.00	
L-10	gal.	0.45	
Kenflex A	lb.	0.26 /	0.33
L	lb.	0.28 /	0.35
Kenplast	lb.	0.20 /	0.24
KP-140	lb.	0.46 /	0.485
Kronisol	lb.	0.355 /	0.39
Kronitex 1, AA, K-3, MX	lb.	0.325 /	0.36
Lauric Acids	lb.		0.45
Lead Stearate #30	lb.	0.36 /	0.41
50	lb.	0.55 /	0.60
P-30	lb.	0.55 /	0.60
London Rosin Oil	lb.	0.16 /	0.18
Magnesium Stearate	lb.	0.41 /	0.46
Methox	lb.	0.395 /	0.43
Millrex	lb.		0.15
Morflex 210	lb.	0.5925	
240	lb.	0.655	
250	lb.	0.91	
300	lb.	0.40	
310	lb.	0.40	
325	lb.	0.40	
330	lb.	0.40	
350	lb.	0.70	
375	lb.	0.40	
410	lb.	0.455	
Nevillac TS	lb.	0.85	
Neville LX 685, 125	lb.	0.12 /	0.125
782	lb.	0.075 /	0.08
Resin R-12	lb.	0.16 /	0.165
-16	lb.	0.16 /	0.165
-A	lb.	0.15 /	0.155
-17	lb.	0.145 /	0.15
-29	lb.	0.15 /	0.155
Nevinol	lb.		0.24
Nilox	lb.	0.1715	
Nuroz	lb.	0.1475	
Ohopex-R-9	lb.	0.3525/	0.3775
Oleic Acids	lb.	0.14 /	0.1975
P-10 Ricinoleic Acid	lb.		0.3475
Panarez 3-210	lb.		0.125*
6-210	lb.		0.12*
7-210	lb.		0.10*
Panarez 12-210	lb.		$0.115*
Para-Flux 2016	gal.	$0.175 /	0.28
4156	gal.	0.255 /	0.275
Para Lube	lb.	0.46 /	0.48
Resin 6600	lb.	0.035 /	0.055
C-230	lb.	0.15 /	0.22
Paracin 8	lb.		0.415
Paradene #1	lb.	0.09 /	0.095
2	lb.	0.095 /	0.10
33	lb.	0.0875/	0.0925
35	lb.	0.0875/	0.0925
Penbro	lb.	0.075	
Pepton 65 Plasticizer	lb.		0.086
Petroflux MV	gal.	0.097	
Picco Aromatic Plasticizers	lb.	0.085	
Resins	lb.	0.085 /	0.19
Piccocizer 30		0.055	
40			0.085
R	lb.		0.05
Piccolastic A Series	lb.		0.0775
C Series	lb.		0.091
D Series	lb.		0.26
E Series	lb.	0.26 /	0.265
Piccolyte Resins	lb.	0.2225/	0.2425
Piccopale Resins	lb.		0.0775
Pitch, Atlas Burgundy	lb.	0.23 /	0.25
Hardwood	lb.		0.07
Stearin	lb.		0.06
Plasticizer LP	lb.	0.075	
MP	lb.	0.085	
MT-511	lb.		0.6925
OLN	lb.		0.38
SC	lb.		0.39
Plastogen	lb.		0.09
Plastolein 9404 TGP	lb.	0.38 /	0.43
Polycin	lb.		0.30
Polymel C-2 Resin	lb.		0.165
-D Powder	lb.	0.185 /	0.195
-DX Resin	lb.	0.1375/	0.1475
-111 Powder	lb.		0.1425
"Plasticil" Resin	lb.	0.105 /	0.1075
"Plasticil-NS" Resin	lb.	0.115 /	0.1175
Polymeric Plasticizer NP-10	lb.	0.44 /	0.48
Prenol A	lb.	0.38 /	0.40
PT 101 Pine Tar Oil	lb.	0.044	
400 Light Pine Tar	lb.	0.044	
600 Medium Pine Tar	lb.	0.044	
800 Heavy Pine Tar	lb.	0.044	
Reogen	lb.		0.145
Resin 82	lb.	0.185	0.205
84	lb.	0.20	0.22
Resinex L-4 & L-5	lb.		0.0375
Resins	lb.		0.0375
Ricinoleic Acid	lb.	0.3275	
Rosin, Wood	lb.		0.1065
Santicizer 140	lb.	0.325 /	0.36
B-16	lb.	0.465 /	0.495
E-15	lb.	0.53 /	0.56
M-17	lb.	0.44 /	0.47
Shellflex	gal.	0.205	
212	gal.	0.175	
292	gal.	0.195	
412	gal.	0.21	
732	gal.	0.2225	
Solros	lb.	0.126	
Tallene	ton	25.00 /	60.00
Tarene 20, 40	lb.	0.029	
Thiokol LP-3	lb.		0.96
TP-90B	lb.		0.59
-95	lb.		0.65
Triacetin	lb.	0.37 /	0.41
Tributyl Aconitate	lb.	0.60	
Phosphate	lb.	0.50 /	0.535
Tricresyl Phosphate	lb.	0.325 /	0.36
Turpol N C-1200	lb.	0.61	
Zinc Laurate	lb.		0.55

Plasticizers and Softeners, Latex

Arlex	lb.	0.26	
Durez 14136	lb.	0.325	
G-2401	lb.	0.2325	
Latex Plasticizer A-12	lb.		0.096
OPD #101	lb.		0.29
104	lb.		0.245
Sorbitol Special	lb.	0.2125	

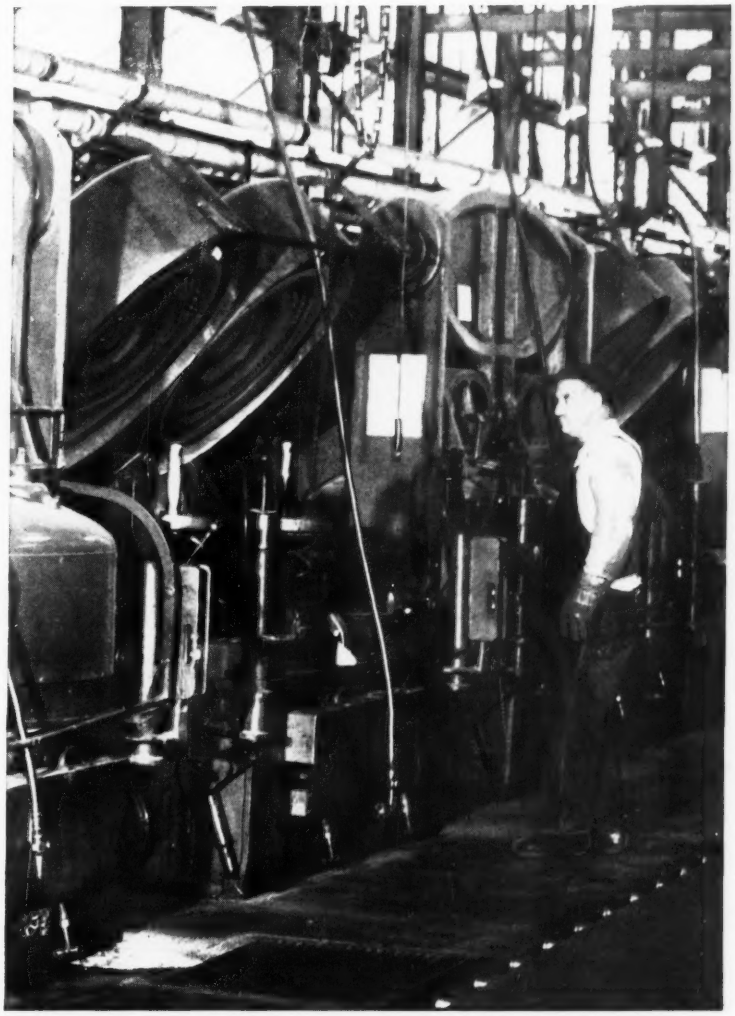
Preservatives, Latex

Ammonia	ton	95.00	
Eastman Inhibitor HPT	lb.		6.00
Formaldehyde	lb.	0.0405*	

Processing Aids and Dispersing Agents

Alrowet D-65	lb.	0.32	
Bakelite Polyethylene Resins			
DGD-4100	lb.	0.38	
DYNH	lb.	0.275	
Butaprene SL	lb.	0.36	
Calcium Stearate	lb.	0.39 /	0.44
Castorwax (Opalwax)	lb.		0.3075
Cyclolube 114	gal.	0.19	
NN-1	gal.	0.125	
-2	gal.	0.125	
-3	gal.	0.125	
-4	gal.	0.135	
Kenflex N	lb.	0.19 /	0.26
Lvocol 0	lb.		0.70
Marbon 8000	lb.	0.36*	
8000A	lb.	0.36*	
8000AE	lb.	0.36*	
8000E	lb.	0.36*	
Millex	lb.	0.07 /	0.10
Neville LX 685, 135	lb.	0.12 /	0.125
685, 180	lb.	0.125 /	0.13

Keep Production Moving



Serviceability Unlimited! Water dilutable emulsions, solvent soluble fluids, greaselike compounds, or spray formulations — there's a Dow Corning release agent to solve release problems with any type of rubber or plastic.

Let Dow Corning field engineers help you select the silicone mold lubricant best for each application in your plant.

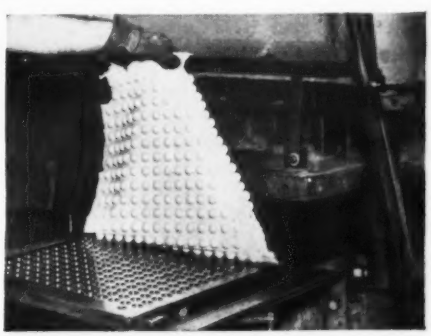
Other Cost-Cutting Silicones that can save you time are silicone electrical insulation for mill and mixer motors; silicone paints that withstand heat, oxidation, and weathering; Silastic® gums and bases for compounding silicone rubbers for unusual service; and Syl-off® coated paper as interleaving sheets in slab molding polyurethane and as a "no-stick" packaging material for sticky products. Write for full information today. Address Dept. 9621a.

Silicone Mold Lubricants Give Fast, Clean Release with Minimum Build-up

Rubber and plastic products break away FAST and CLEAN from molds made "stick-free" with Dow Corning Silicones. These job-proved parting agents prevent sticking; assure good reproduction of fine surface detail; prevent tearing; keep rejects to a minimum.

Another money-saving feature: Heat resistant Dow Corning silicone release agents won't carbonize! Build-up on molds is negligible—meaning your mold cleaning costs go down, mold service life goes up.

In short, Dow Corning silicone mold lubricants help you mold superior products—help you maintain economical high speed production.



Your best source of technical assistance in adapting silicones to your products or operation is the Dow Corning office nearest you.

first in silicones

Dow Corning CORPORATION
MIDLAND, MICHIGAN

ATLANTA BOSTON CHICAGO CLEVELAND DALLAS LOS ANGELES NEW YORK WASHINGTON, D. C.

Parco Resin #200-S-1	lb.	$0.23	
Piccotex Resins	lb.		$0.25
Rubberol Compound	lb.		0.2575
TI-Sperse	lb.		0.21

Processing Aids, Latex

Indusoil L-5	lb.	0.05 /	0.0775
Ludox HS Colloidal Silica	lb.	0.1625	

Reclaiming Materials

Actinol P Tall Oil Pitch	lb.	0.125 /	0.275
Emery 906 Tall Oil Pitch	lb.	0.0125/	0.0375
Neville LX 777	gal.	0.23 /	0.33
809	gal.	0.23 /	0.33
Picco C-42 Reclaiming Agent	gal.		0.23
D-4 Reclaiming Agent	gal.		0.42
D-12 Reclaiming Agent	gal.		0.30
Pitt-Consol 500	lb.	0.23 /	0.255
(Concentrated)	lb.	0.30 /	0.325
500 NS	lb.	0.31 /	0.335
(Concentrated)	lb.	0.38 /	0.405
Polymel RC-57	lb.		0.30
RR-10	lb.		0.37
Sodium Hydroxide—Flake	lb.	0.052	
Solid	lb.	0.048	
Tallene	ton	25.00 /	60.00

Release Agents

Acintol FA1 Special Tall Oil Fatty Acid	lb.	0.05 /	0.0725
Tall Oil Fatty Acid	lb.	0.05 /	0.0725
FA2 Tall Oil Fatty Acid	lb.	0.06 /	0.0825
Akro-Gel	lb.		0.135
Aluminum Stearates	lb.	0.39 /	0.44
Amber (Flakes)	lb.		0.115
Aquadag	lb.		3.50
Aquarex D	lb.		0.81
L	lb.		0.94
MDL	lb.		0.33
ME	lb.		0.82
WAQ	lb.		0.21
Colite Concentrate	gal.		0.90
Dow Corning 7 Emulsion	lb.		1.59
20 Compound	lb.		1.74
35A Emulsion	lb.		1.09
35B Emulsion	lb.		1.09
36 Emulsion	lb.		1.09
37 Emulsion	lb.		1.09
Dri-Lube	lb.		0.22
ELA	lb.		0.82
Epolene E-10	lb.	0.35 /	0.42
-11	lb.	0.35 /	0.42
-12	lb.	0.35 /	0.42
N-10	lb.	0.275 /	0.345
-11	lb.	0.275 /	0.345
Hallco Inner-Lube	lb.		0.25
Hawkeye Soap	lb.		0.14
Ivory	lb.		0.15
Lubri-Flo	gal.		10.00
Lupar	gal.		1.90
Mold Wiz 1-C	lb.		1.00
#249	gal.		6.00
#U-5-6	gal.		6.00
Olate	lb.		0.18
Orvus AB	lb.		0.115
ES	lb.		0.114
WA	lb.		0.1825
Peerless Rubber Lube No. #744	gal.		0.75
751	lb.		0.17
Prodag	lb.		0.32
Purity Soap	lb.		0.1725
Silrex S-1	lb.		0.65
Solricin 135	lb.		0.12
Union Carbide L-45 Silicone Oil	lb.	2.74	
-522 Organo-Silicone Oil Emulsion	lb.	2.58	
LE-45 Silicone Oil Emulsion	lb.	1.09	
-46 Silicone Oil Emulsion	lb.	1.09	
-450 Silicone Oil Emulsion	lb.	1.09	
WS-95 Silicone Gum Solution	lb.	0.60	
-951 Silicone Gum Solution	lb.	0.60	

Retarders

E-S-E-N	lb.		0.41
Maleic Acid	lb.	0.2875	
Anhydride	lb.	0.225	
Malic Acid	lb.	0.55	
Nadic Anhydride	lb.		1.24
Retarder BA	lb.		0.29
J	lb.		0.70
PD	lb.		0.41
W	lb.		0.47
Retardex	lb.	0.47 /	0.50
Turgum S	lb.	0.156 /	0.176

Solvent

Amoco Toluene	gal.		0.255*
Xylene	gal.		0.285
Amyl Acetate	lb.	0.155	
Bronoco Lacolene	gal.	0.205*	
Normal Hexane	gal.	0.233*	
Rubber Solvent	gal.	0.17*	
Buty Acetate, Normal	lb.	$0.145 /	$0.185
Secondary	lb.	0.1225/	0.1625
Alcohol, Normal	lb.	0.155 /	0.195
Secondary	lb.	0.125 /	0.165
Carbon Bisulfide	lb.	0.071 /	0.086
Tetrachloride	lb.	0.1075	
Cyclohexane	gal.	0.36	
Dichloroethyl Ether	lb.	0.155	
Ethyl Acetate	lb.	0.125 /	0.165
Alcohol	gal.	0.52	
Ethylene Dichloride	lb.	0.09	
Hexane	lb.	0.1584/	0.385
Isobutyl Acetate	lb.	0.1275/	0.1675
Alcohol	lb.	0.13 /	0.17
Isopropyl Acetate	lb.	0.115 /	0.155
Alcohol	gal.	0.46	
Methyl Ethyl Ketone	lb.	0.125 /	0.165
Methylene Chloride	lb.		0.11
Monochlorbenzene	lb.	0.0875	
Nadone Cyclohexanone	lb.	0.31	
Naphtha, Solvent	gal.	0.295 /	0.385
Neville Blend #27	gal.	0.35 /	0.42
Petroleum Ether	gal.	0.185 /	0.49
Tecsol	gal.	0.56 /	0.77
Toluol	gal.	0.255	
Trichlorethylene	lb.	0.1126	

Stabilizers, Latex

Alubragum 825	lb.	0.10* /	0.11*
Aquarex MDL	lb.		0.33
ME	lb.		0.82
NS	lb.		0.60
WAQ	lb.		0.21
BRIJ 35	lb.	0.48	
Diglycol Laurate	lb.		0.57
Oleate	lb.		0.57
Dimethylamine	lb.	0.28	
Emersol 233 LL Oleic Acid	lb.	0.145 /	0.195
Nonisol 100	lb.	0.39	
Nonox WSL	lb.		1.47
WSP	lb.		1.50
S-1	lb.		0.815
Sequestrene AA	lb.	0.70	
ST	lb.	0.43	
Stablex A	lb.		0.80
B	lb.		0.50
G	lb.		0.50
TI-Sperse	lb.	0.21 /	0.21
Ultrawet DS or KX	lb.	0.26	
Volclay	ton		14.00

Tackifiers

Acintol R Tall Oil Rosin	lb.	0.1375/	0.1425
Bakelite BKR-2620	lb.	0.385	
CKR-0036	lb.	0.49	
-1634	lb.	0.38	
CRL-3060	lb.	0.445	
Butac	lb.	0.1735/	0.1835
Durez 12603	lb.	0.29	
Indopol H-100	gal.	0.85	
-300	gal.	1.00	
L-10	gal.	0.45	
Natac	lb.	0.1685/	0.1785
Nevillac 10°	lb.	0.39 /	0.39
910 Cmpd	lb.	0.70 /	0.70
Hard	lb.	0.31 /	0.31
Soft	lb.	0.32 /	0.32
TS	lb.	0.85 /	0.85
Nevidene LX-509	lb.	0.245 /	0.25
R-1	lb.	0.195 /	0.20
-3	lb.	0.185 /	0.19
-5	lb.	0.175 /	0.18
-6	lb.	0.165 /	0.17
Schenectady SP-12 Resin	lb.	0.4075	
-102 Resin	lb.	0.3975	
-103 Resin	lb.	0.4075	
-126 Resin	lb.	0.38	
-553 Resin	lb.	0.3075	
-560 Resin	lb.	0.29	
-1047 Resin	lb.	0.3425	
-8014 Resin	lb.	0.355	
ST-5000 Series	lb.	0.2225	
Synthol	lb.		0.2875
Tarpine	lb.	0.035	
Turgum SB	lb.	0.105 /	0.115
Velsicol GD 5-28	lb.	0.075	
GE-9 Resin	lb.	0.06	
M-144 Oil	lb.	0.025	
X-30 Resin	lb.	0.12	
Zinar	lb.	0.1926	
Zirex	lb.	0.1875	
Zitro	lb.	0.1825	

Tackifiers, Latex

Piccopale Emulsion A-43	lb.		0.0995
Resin Emulsion J-769-A	lb.		0.182

Thickeners, Latex

Alcogum AN-6	lb.		0.06
-10	lb.		0.09
-25	lb.		0.31
PA-15-A	lb.		0.135
-B	lb.		0.135
Casein PMX	lb.		0.32
Darex 632L	lb.	0.275	
Hycryl A-1000	lb.	0.09	
-2000	lb.	0.335	
Jorco 606	lb.		0.12
A-1002	lb.	0.12	
Paragum #12	lb.		0.12
A-25	lb.		0.12
Protovac PV-430	lb.		0.35

Thickener #17	lb.	$0.09
TI-Gum	lb.	0.105

Wetting Agents, Latex

Beaconol M	lb.	0.42
S	lb.	0.40
T	lb.	0.67
Ethyl Lactate	lb.	$0.54
Nacconol NR	lb.	0.13
NRSF	lb.	0.405
SL	lb.	0.095
Renex 600 Series	lb.	0.235
Sandozin D-100	lb.	0.29
Tween 20	lb.	0.425

Vulcanizing Agents

Black Bird Brand Sulfur	lb.	0.029 / 0.0765
Catalin Resin 9273	lb.	0.3825
DADT	lb.	3.00
DCI Light Magnesium Oxide	lb.	0.235
Magnesium Oxide #601 Grade	lb.	0.2525
E-3 Grade	lb.	0.215
Dibenzo G-M-F	lb.	2.60
Dichlorobenzidine, Urethane Grade	lb.	1.45
G-M-F	lb.	2.60
Ko-Blend I.S.	lb.	0.39 / 0.39
Linde Chemical-Loaded Molecular Sieve CW-2015	lb.	3.00
Maglite D	lb.	0.235
K	lb.	0.235
M	lb.	0.27
Y	lb.	0.235
Magnesia, Calcined	lb.	0.23
Michigan #15 Heavy Calcined Magnesia	lb.	0.055
#30 Light Calcined Magnesia	lb.	0.2525
1782 Magnesia	lb.	0.2525
Mist Brand Sulfur	lb.	0.0405/ 0.093
PAPI	lb.	1.50
PRDSD-7875 Poly-Dispersion	lb.	1.35 / 1.50
PSD-75 Poly-Dispersion	lb.	0.37 / 0.44
PSID-65 Poly-Dispersion	lb.	0.60 / 0.75
Schenectady SP-1055 Resin	lb.	0.45
Seamag	lb.	6.50
Spider Brand Sulfur	lb.	0.0285/ 0.076
Sulfur, MC	lb.	0.0275
Rubbermakers	lb.	0.0245
Telloy	lb.	5.00
Thiokol VA-7	lb.	0.75
TODI	lb.	2.50
Vandex	lb.	6.50
Vultac 2	lb.	0.47 / 0.49
3	lb.	0.51 / 0.53

Vulcanizing Agents, Latex

Mist Brand Sulfur	lb.	0.0405/ 0.093
Sulfur, Dispersed	lb.	0.12
Dispersion #3	lb.	0.097

Synthetic Rubber

(*Continued from page 130*)

Cold SBR Latex

CL-101		$0.28[a]
Copo 2101		0.30[c]
2102, 2105, 2110		0.32[c]
2108		0.30[c]
2109		0.2775[c]
3852		0.30[c]
FR S 2105	0.32[c] /	0.366[c]
Naugatex 2105, 2107	0.32[a] /	0.38[a]
2108	0.30[a] /	0.38[a]
2113	0.29[a] /	0.36[a]
Pliolite Latex 2101		0.30[c]
2105, 2107		0.32[c]
2108		0.30[c]
Polysar Latex 721		0.32[c]
722, 723		0.32[c]
741		0.30[c]
781		0.675[c]
S-2101		0.26[a]
-2105		0.28[a]
-2107		0.32[a]
-2108		0.29[a]

Misc. SBR

Dow Latex 512K, 512R, 513K, 529HS, 529K, 630, 762K, 762W		0.275[b]
512L, 560, 737K		0.295[b]
546C		0.265[b]
566		0.365[b]
762L		0.315[b]
FR-S 110 (latex)	0.3000[c]	
-150 (latex)	0.3000[c]	
-174 (latex)	0.2950[c]	
-176 (latex)	0.2775[c]	
-182	0.241[c] /	0.247[c]
-184	0.1885[c] /	0.1945[c]

Urethane Types

Adiprene L, LD-167, -213	$1.15 /	$1.65
Cyanaprene 4590	lb.	1.30[a]

Reclaimed Rubber

(*Continued from page 126*)

An eastern reclaimer reported that although reduced, sales of reclaim during the period were substantially better than expected. Another eastern reclaimer and a Midwest reclaimer, however, reported that sales were quite slow, and no immediate pickup is expected.

According to the monthly report of The Rubber Manufacturers Association, Inc., May production of reclaimed rubber amounted to 25,115 long tons in June, compared with 23,317 long tons in May, and consumption was 21,983 long tons, against 21,989 long tons in May.

RECLAIMED RUBBER PRICES

Whole tire, first line	$0.115
Third line	.1075
Inner tube, black	.17
Red	.22
Butyl	.16
Light carcass	.22
Mechanical, light-colored, medium gravity	.185
Black, medium gravity	.10

The above list includes those items or classes only that determine the price basis of all derivative reclaim grades. Every manufacturer produces a variety of special reclaims, in each general group separately featuring characteristic properties of quality, workability, and specific gravity, at special prices.

Trade Fairs

(*Continued from page 121*)

featured by Reifenwerk Heidman.

Soviet exhibits included plastics and synthetic rubbers, among them sodium butadiene rubbers, dark and light polyisobutylene rubbers, as well as epoxy resins, fluorocarbons, foamed polystyrene, PVC, and polyurethane. China offered various molding compounds, cups and combs from polystyrene and polyamide, and polyurethane foam.

MICHELIN CO. will build a synthetic rubber plant in the Bordeaux, France, area, the company announced. The announcement did not specify the type of rubber to be produced, but said the plant would cost 60 million francs and would begin operations in 1963.

SOCIETA SUPEGA, Tur'n, Italy, a subsidiary of Societa Pirelli, will build a factory for production of rubber shoes at Triggiana, near Bari. The plant, expected to start production this fall, will have a capacity of four million pairs of rubber shoes of all types.

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Chief Engineer for medium-size mechanical goods plant serving the automotive industry. Located in northern Ohio. Chemical Engineer or Chemist with at least 10 years' experience in mechanical rubber goods. Must have proven ability as administrator. Responsibilities include Development, Tooling, Industrial Engineering, and Plant Engineering. Salary range $12,000-$13,000. Reply in confidence to R. B. Forni, Ott & Forni Personnel Specialists, 415 L-O-F Building, Toledo 2, Ohio. Employer pays all charges incidental to hire.

CHEMIST FOR OPEN-CELL SPONGE RUBBER COMPOUNDING. Must have at least four years' experience as above. Location Midwest. Salary, benefits, above average. Send résumé in confidence. Address Box No. 2636, care of RUBBER WORLD.

CHEMIST OR CHEMICAL ENGINEER—NEW PRODUCTS Development. Opening in Development Department for man with three years' minimum general compounding experience and new product development. Send complete résumé. Salary open. Address Box No. 2637, care of RUBBER WORLD.

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Progressive rubber molding company is looking for a supervisor for the molding department. The company is expanding rapidly, which offers the right man a chance to grow with it. Must be capable of dealing with personnel. Salary commensurate with experience. Address Box No. 2644, care of RUBBER WORLD.

SITUATION WANTED

CHEMIST WITH 15 YEARS' EXPERIENCE—RESIDENT OF Northern New Jersey. Experience in Rubber Mill, Compounding, also Latex Dipping, and Solvent Latex Adhesives. Address Box No. 2642, care of RUBBER WORLD.

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2—THROPP 16" x 48" MILLS. FARREL 16" x 40" MILL. OTHER sizes up to 60". Hydraulic Presses: 500-ton Utility Press, four 30 x 48 openings, 300-ton upstroke 40" x 50", 300-ton upstroke 22" x 35", 240-ton upstroke with ten 24" x 56" platens, 200-ton Williams and White 24" x 42" platens, 2 Birdsboro 200-ton, 32" x 24", 4 openings, 200-ton Farrel 30" x 30", Farrel 150-ton 36" x 36". Also other sizes. Royle #2 Tuber. NAT. 3½" crosshead Extruder. Adamson 6" Rubber Extruder. 60" Spreader heads. 50" Smoothing Calender. New and used laboratory 6" x 13", 6" x 16", and 8" x 16" Mills and Calenders. Baker-Perkins and Day heavy-duty jacketed Mixers up to 200 gallons. Hydraulic pumps and accumulators, Peerless 2-H.P. Rubber Bale Cutter. 48" x 14" Dinker. Rotary Cutters. Taylor-Stiles 3-H.P. Rubber Pelletizer. Banbury mixers, crushers, churns, tubers, vulcanizers, gas boilers, etc. SEND FOR SPECIAL BULLETIN. WE BUY YOUR SURPLUS MACHINERY. STEIN EQUIPMENT COMPANY, 107-8TH STREET, BROOKLYN 15, NEW YORK. STERLING 8-1944.

FOR SALE—1—10" x 24" 3-ROLL VERTICAL CALENDER, 15 HP. 1—6" x 16" 2-roll mill. 1—125-gal. Day gearless pony mixer, 10 HP. 1—3½" National Erie Extruder, 15-HP. CHEMICAL AND PROCESS MACHINERY CORP., 52 9th Street, Brooklyn 15, New York. HY 9-7200.

ONE 3-ROLL THROPP CALENDER 18" x 54", 90-H.P. VARIABLEspeed D.C. motor. 125-H.P. M.G. Set. Controls. Address Box No. 2640, care of RUBBER WORLD.

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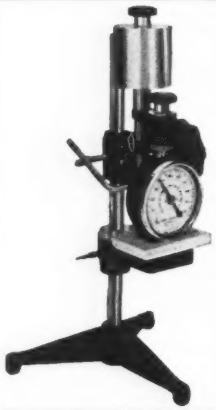

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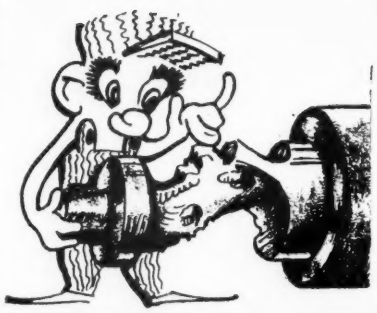

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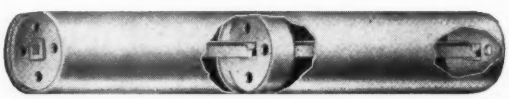

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646

PITT-CONSOL 646 PEPTIZER
PHYSICAL PROPERTIES

Physical State	Colorless, low viscosity liquid
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